Transportation Demand Management Case Studies and Regulations

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Introduction

This report is intended to serve as a guide for municipalities looking to amend existing or adopt new bylaws or zoning ordinances that advance Transportation Demand Management (TDM) measures as part of the review and approval of development projects.

Case studies highlighting TDM measures already implemented by municipalities, both in Massachusetts and nationwide, are identified in this report. The examples include a variety of approaches ranging from setting specific trip reduction targets, providing a menu of TDM alternatives to consider for implementation, and to applying various parking measures. The bylaw or zoning ordinance language of each identified case study and measure is available in the appendices for further reference.

TDM policies and programs taking place at the state level both in Massachusetts and nationwide are summarized and a model bylaw outlining a range of TDM measures is provided. While the TDM policies, programs, measures included in this report provide a strong framework, it is critical that municipalities looking to establish TDM programs develop bylaw or zoning ordinance language that meets their particular goals. This report is intended to provide a variety of examples that can help municipalities craft language to meet these goals.

What is Transportation Demand Management (TDM)?

TDM refers to a package of policies and programs that are designed to reduce drive-alone trips and enable the transportation system to function more effectively and efficiently through measures that shift passengers from single-occupancy vehicle (SOV) travel. Specifically, TDM encourages using alternative travel modes (bicycling, walking, and transit); promoting alternatives to SOV travel (teleworking, ridesharing including carpooling and vanpooling); increasing the number of passengers in vehicles (carpooling and vanpooling); and eliminating the need for some trips altogether (compressed work week).

Reducing traffic congestion, improving air quality, decreasing energy consumption, and sometimes saving time and money for travelers, businesses and municipalities are all benefits of implementing TDM measures. These measures underlie transit-oriented development, complete streets programs, as well as livability and sustainability initiatives and can be applied in support of a variety of development patterns, ranging from urban to rural. TDM measures should be followed when designing development projects so that alternatives to SOV travel are naturally encouraged. Municipalities that successfully alleviate traffic impacts will become more desirable places to live, work, visit, and do business.

A range of fundamental TDM measures are outlined in Table 1. It is important to note that there is not a one size fits all solution for municipalities to encourage alternatives to SOV travel. Rather, the decision to implement specific TDM measures should depend on the municipality, particular sites, and specific traffic congestion issues.

Table 1: Range of TDM Measures

Parking Management
- Parking Cash-Out
- Parking Pricing – Charge Market Rate/Charge for On-Street Parking
- Preferential Carpool/Vanpool Parking
- Shared Parking

Pedestrian and Bicycling Improvements and Facilities
- Secure and safe bicycle parking (short and long term) and storage (bicycle racks and stalls)
- Showers and lockers for bicyclists
- Bicycle sharing
- Connectivity between adjacent sites and paths
- Infrastructure improvements (traffic calming, bicycle lanes)

Site Design/Land Use
- Require new buildings to locate their parking behind buildings, away from the street
- Limit driveway curb cuts
- Require densifications/mixed-use elements for new developments
- Promote location efficient residential and commercial development (proximate and oriented to transit services, has good walking and bicycling conditions, and includes infill)

Employer-Based
- Subsidize Transit
- Flexible employee work schedules (compressed work week, flexible arrival/departure times)
- Teleworking
- Ride-sharing services (guaranteed ride home, ride-matching)
- Education (inform employees of options)
- Provide incentives and rewards programs (offer transit passes pre-tax or subsidize their purchase)

Public Transit
- Coordinate with transportation providers to bring service to the project site
- Employer-provided shuttle bus services

Transportation Management Association (TMA) membership

Car Sharing

Provisions for bus shelters and information kiosks

Active marketing and promotion of transportation options

TDM in the MAPC Region

MAPC reviewed all the bylaws and zoning ordinances of the 101 cities and towns in the MAPC region to determine whether, and to what extent, they include TDM measures. Key observations are as follows and are also depicted in Figures 1-3.

- 61 percent of MAPC's municipalities contain TDM measures in their bylaws or ordinances to varying degrees of detail. These municipalities are distributed evenly throughout the MAPC region.

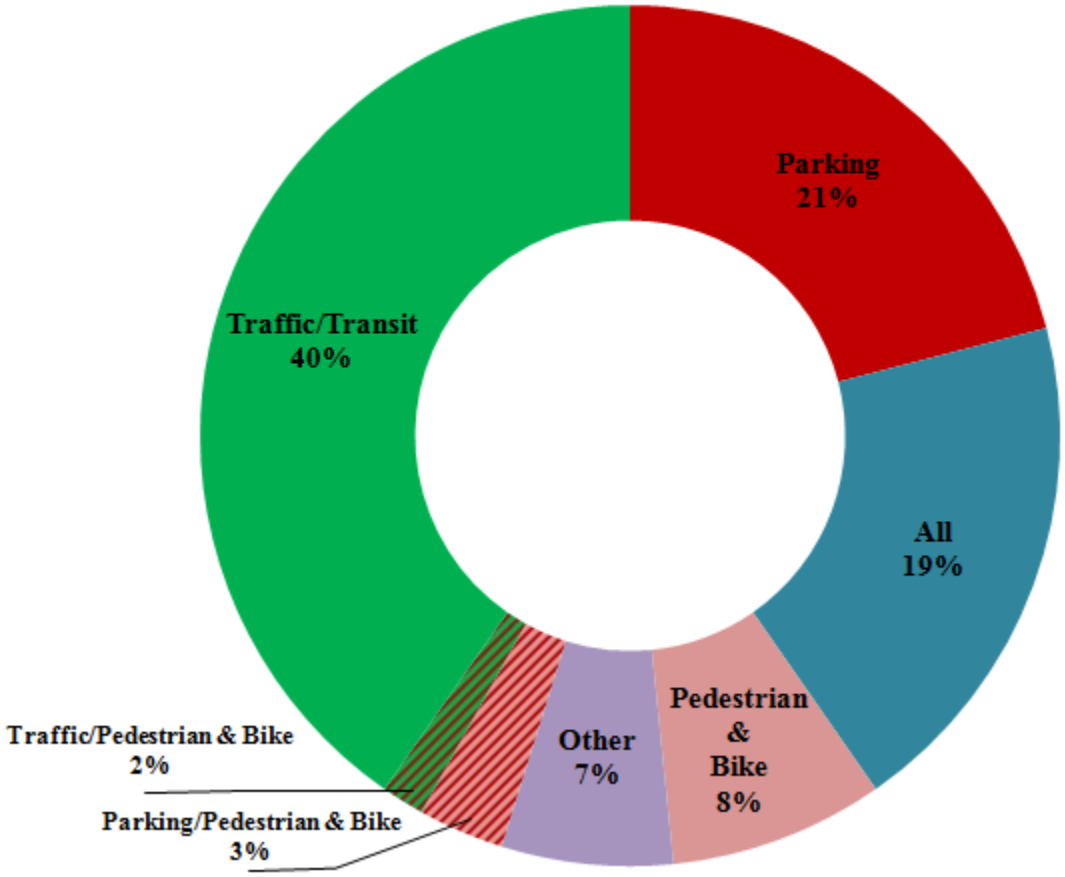
- 26 percent of MAPC's municipalities that contain TDM measures in their bylaws or ordinances apply as overlay districts, not the municipality as a whole.

- 59 percent of MAPC's municipalities that do have TDM measures in their bylaws and ordinances specifically address TDM pertaining to traffic/transit. At 40 percent, TDM measures related to parking are the next most frequent.

- 19 percent of MAPC's municipalities have TDM measures in their bylaws or ordinances include each type of TDM measure category (pedestrian/bicycle, parking, traffic/transit, and other). These municipalities are primarily concentrated in the Inner Core.

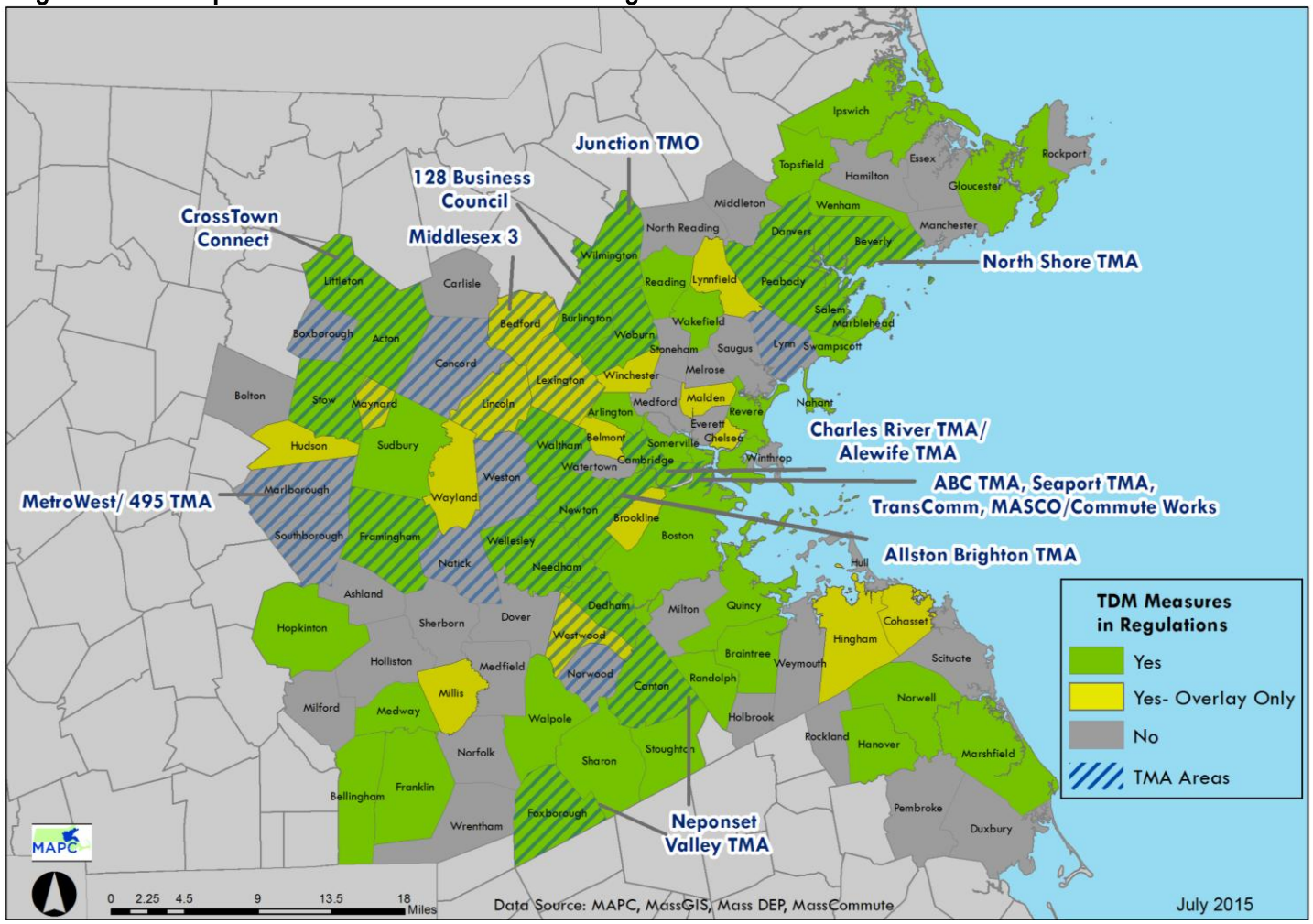
- Transportation Management Associations (TMAs) have service areas in 39 percent of MAPC's municipalities that contain TDM measures in their bylaws and ordinances.

Figure 1: Types of TDM Regulations



While municipalities in the MAPC region do include TDM measures in their bylaws or zoning ordinances, there is considerable opportunity for various TDM measures to be more widely adopted. Municipalities that implement TDM measures on a case-by-case basis as part of a Special or Conditional Permit, Condition of Approval, or site plan review process were not included in this mapping exercise.

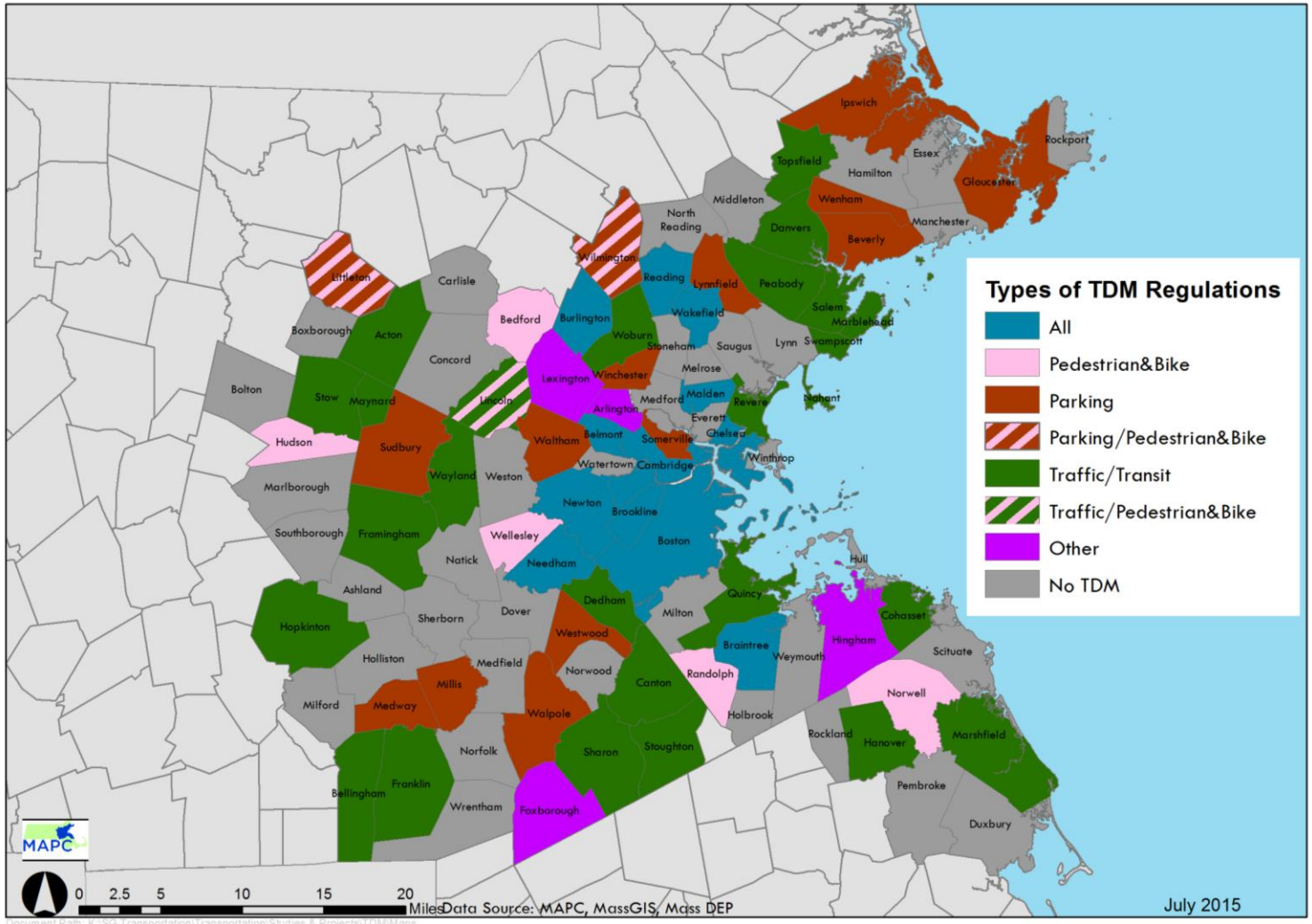
Figure 2: Municipalities with TDM Measures in Regulations



Municipalities that implement TDM measures on a case-by-case basis as part of a Special or Conditional Permit, Condition of Approval, or site plan review were not mapped.

CrossTown Connect also includes Westford.
The JunctionTMO also includes Andover and Tewksbury.
Middlesex 3 Coalition also includes Billerica, Chelmsford, Lowell, Tewksbury, Tyngsborough, and Westford

Figure 3: Types of TDM Regulations



Municipalities that implement TDM measures on a case-by-case basis as part of a Special or Conditional Permit, Condition of Approval, or site plan review were not mapped.

All – TDM measures including Pedestrian/Bike, Parking, and Traffic/Transit.
Other – TDM measures that do not fit the above categories (e.g., joining a TMA or requiring a mitigation fee.

Recommendations

Municipalities are faced with the challenges of balancing the demands of being business-friendly, attracting new development, managing the demands on the transportation network, as well as working with developers to develop TDM programs. In the long run, the successful implementation of TDM policies and programs can have a significant benefit on the efficiency of the transportation network and economy of an area. In order to achieve maximum success, TDM policies and programs need to be carefully planned, implemented, and monitored. Following a comprehensive review of local and national case studies, MAPC identified key trends that are consistently present with successful TDM programs. To better inform the report's recommendations, MAPC spoke with several municipalities and TMAs to get a better understanding of the successes, challenges, and history of implementing TDM policies and measures[1]. Specific examples of each of the key trends identified below are identified throughout the report.

Partnerships

- Implement TDM programs by coordinating and collaborating with public agencies, multiple employers, or through public-private partnerships (e.g., jointly evaluate TDM programs and allocate funding).

- Develop working relationships among municipalities, state agencies, TMAs and the private sector to achieve TDM objectives. This is essential and should start as early as possible (e.g., cooperatively establish policies).

- Negotiate reasonable and equitable mitigation agreements with the private sector (e.g., building and occupancy permits will only be issued by a municipality after a TDM plan has been approved).

- Develop TDM programs that are simple and straightforward.

Collaboration

- Require employers and municipalities to become TMA members.

- If a new development is within a TMA's service area, membership and active collaboration should be required. If the development is not within a TMA service area, then participation in MassRIDES[2] and the area Regional Transit Authority[3] (RTA) should be required.

[1] The names and dates of those interviewed are included in the Resources section.

[2] MassRIDES is the Commonwealth's travel options service.

[3] RTAs provide fixed route and paratransit service across the state. Six RTAs service the MAPC region: Brockton Area Transit Authority (BAT), Cape Ann Transportation Authority (CATA), Greater Attleboro Taunton Regional Transit Authority (GATRA), Lowell Regional Transit Authority (LRTA), MetroWest Regional Transit Authority (MWRTA), and Montachusett Regional Transit Authority (MRTA).

Funding

- Pool resources and obtain funding from multiple sources (both private and public) to ensure TDM program success.

- Ensure that the private sector is making significant funding contributions (e.g., require mitigation requirements and/or monetary contribution be based on significance of the transportation impacts or total cost of the development project).

- Seek additional funding from local, state, and/or federal transportation sources. For example, prioritize or dedicate a portion of CMAQ (Congestion Mitigation and Air Quality Improvement) funds for TDM programs.

- Ensure TDM programs are cost effective to the implementing body and to those who benefit from the program itself (e.g., through monitoring, reporting and enforcement).

Implementation and Monitoring

- Develop clear and succinct municipal bylaw language that includes very specific requirements.

- Make incremental changes to bylaws. Adopting a series of small and attainable amendments will allow for a gradual transition to implement TDM measures rather than the potential of creating resistance.

- Strive to implement a concise list of targeted and measurable TDM goals and requirements over a designated period of time (e.g., mode share goals, vehicular trips).

- Establish a well-defined process to monitor progress and compliance towards clearly established goals (e.g., vehicular trips) and outcomes (e.g., annual report or survey).

- Fund a transportation coordinator position to ensure commitments to TDM measures are implemented. This could be a standalone position, or folded into a current employee's job duty if possible.

- Include precise language to ensure that there is a clear transfer of responsibility in the event of a change in ownership or tenant turnover (e.g., incorporate in deed, link to an occupancy permit).

Enforcement

- Establish policies for non-achievement or non-compliance of program goals or failure to implement a TDM program. For example, a municipality can hold off on issuing new permits (e.g., occupancy permit) or put a lien on property in the amount of the dues which are owed by the developer. It is critical that municipalities and developers establish cooperative relationships – enforcement should be carried out as a final recourse.

Incentives

- Offer developers and employers a range of services (e.g., bicycle parking and amenities, commuter subsidies, fees in-lieu of parking, car sharing, and reduced parking requirements for (re)development sites within walking distance from frequent transit) when developing a TDM program. A limited range of services may not be appealing to all employers, developers, or users of the program.

- Establish incentives for employers who meet TDM goals or who join a TMA (e.g., waiving fees for annual reporting to a municipality or allowing costs associated with a TDM program to be tax deductable).

- By working with TMAs, employers should establish incentives for employees (e.g, bicycling/walking competitions, prepaid Charlie Cards, subsidized MBTA passes, subsidized ridership on area RTAs, and gift cards).

Education

- Educate municipal officials, residents, employers, and employees about the benefits of TDM measures (e.g. through the area TMA).

In many cases, municipalities include TDM regulations on a case-by-basis as part of a Special or Conditional Permit, Condition of Approval, or site plan review process. As stated earlier, of the municipalities that included TDM regulations 26 percent applied only to overlay districts, not the municipality as a whole. MAPC recommends that municipalities adopt new or update existing TDM regulations as part of an overall strategy rather than in a piecemeal manner. Once TDM regulations are adopted, it is critical that there be a strong ongoing review process in place to ensure their effectiveness.

State Level TDM Policies and Programs

TDM is addressed on the state level as part of the Massachusetts Environmental Policy Act (MEPA) review process, the Massachusetts Rideshare Regulation, and with Transportation Management Associations (TMAs). There is also pending state legislation intended to further advance TDM policies and programs. To ensure the success of TDM policies and programs, it is important that the state, TMAs, and municipalities convey a clear and consistent message. An explanation of each of these state-level programs is provided below.

Massachusetts Environmental Policy Act (MEPA)

Established as state law in the late 1970s, MEPA is a uniform system of environmental impact review with the intent to reduce the potential for harm to the environment from certain development and transportation projects. The intent of MEPA review is to inform project applicants and state agencies of potential adverse environmental impacts while a proposal is still in the planning stages. The developer and all relevant state agencies are required to identify any aspects of a proposed project that may necessitate additional description or analysis prior to the issuance of a certificate and Section 61 Findings by the

Executive Office of Energy and Environmental Affairs. MEPA also requires developing enforceable mitigation commitments, which will become permit conditions for the project.

Section 61 Findings

Section 61 Findings require state agencies and authorities to review, evaluate and determine the impacts on the natural environment of all projects or activities requiring permits issued by the state[4]. Findings are issued describing the environmental impacts. Although Section 61 Findings provide a 'template' for permit conditions, participating state agencies are responsible for issuing permits, not MEPA. For example, the Massachusetts Department of Transportation (MassDOT) issues Highway Access Permits.

Transportation Impact Assessment (TIA) Guidelines

Adopted by MassDOT in 2014, the primary purpose of the Transportation Impact Assessment (TIA) Guidelines are for the preparation of transportation analysis components of development project filings under MEPA. Through the MEPA review process, MassDOT negotiates with developers to establish an equitable mitigation package for each project; which includes TDM. When addressing TIA Guidelines, a developer should include specific, measurable TDM commitments. In turn, these commitments will be tracked and monitored through the project's Transportation Monitoring Program. In addition to evaluating the adequacy of the transportation mitigation, the monitoring program also addresses the effectiveness of the TDM program.

The TIA Guidelines emphasize transportation-efficient development and enhancement of transit, bicycle, and pedestrian facilities, as well as foster implementation of on-going, effective TDM programs. A TIA needs to identify existing TDM options, relevant programs and providers, and potential solutions in the study area. Detailed TDM program information is presented in Section 4.III. of the TIA Guidelines as well as monitoring . Municipalities should align their TDM policies and programs with those outlined in the TIA Guidelines and ensure that MEPA projects with TDM commitments are implemented.

Appendix A MassDOT's Transportation Impact Assessment Guidelines

State Policies that Support TDM Policies and Programs

MassDOT and the Commonwealth are advancing several policy initiatives that seek to emphasize and support a balanced approach to providing a multi-modal transportation network. This balanced approach directly supports TDM policies and programs since there is a central focus on increasing the number of trips taken by walking, bicycling, and public transit modes. Summarized in chronological order, these statewide policy directives include:

Healthy Transportation Directive

In 2013, MassDOT announced a Healthy Transportation Policy Directive which requires all state transportation projects to increase walking, bicycling, and public transit options. This Directive is intended to promote multimodal access and will facilitate the construction of a healthy and sustainable transportation system.

[4] M.G.L., chapter 30, section 61.

Together, these initiatives seek to improve transportation services for Massachusetts residents while advancing public health, safety, and the natural environment. All three initiatives are consistent with MetroFuture, MAPC's 30-year plan for the region, which supports a vision of smart growth and regional collaboration through the promotion of efficient transportation systems and conservation of land and natural resources.

Mode Shift Goal

In 2012, MassDOT established a Mode Shift Goal which calls for tripling the share of travel in Massachusetts by walking, bicycling, and public transit by 2030. The Mode Shift Goal will promote an enhanced quality of life by improving the environment and maintaining capacity on the highway network. By maintaining capacity on the highway network, other travel options will absorb travel demand that would otherwise contribute to highway congestion and, in turn, hinder the Commonwealth's potential for economic growth. In addition, positive public health outcomes can be achieved by providing healthier transportation options.

GreenDOT

In 2010, MassDOT launched GreenDOT, a comprehensive environmental responsibility and sustainability initiative intended to "green" the Commonwealth's transportation system. GreenDOT is driven by three primary goals:

- Reduce greenhouse gas (GHG) emissions;
- Promote the healthy transportation options of walking, bicycling, and public transit; and
- Support smart growth development.

Healthy Transportation Compact

The Healthy Transportation Compact is an inter-agency initiative designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment, and create stronger communities. Components the 2009 transportation reform law charges the Compact with include:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation;
- Increasing bicycle and pedestrian travel;
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board to effectively implement a policy of complete streets for all users, consistent with the current edition of the Project Development and Design Guide; and
- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions.

Global Warming Solutions Act

Adopted in 2008, the Global Warming Solutions Act requires a reduction of greenhouse emissions in Massachusetts to 10-25% below 1990 levels by 2020 and 80% below 1990 levels by 2050. In order to accomplish this goal, it will be necessary to increase the use of public transit and other non-motorized transportation alternatives.

MassDOT Project Development and Design Guidebook

Released in 2006, the Project Development and Design Guidebook takes a flexible and accommodating approach to the construction and design of roadways in Massachusetts. By integrating multi-modal planning and design into every chapter, the Guidebook strives to support a transportation system providing seamless, functional and safe access for all users. In addition, this Guidebook provides direction to the design of Complete Streets. The Guidebook mainstreams non-motorized planning into the project development process and ensures that the needs of non-motorized users remain integral to project planning and design. The needs of, and the methods to accommodate non-motorized modes of transportation are not segregated into their own sections but are addressed in every chapter of the Guidebook.

Massachusetts Rideshare Regulation

Currently administered by the Massachusetts Department of Environmental Protection (MA DEP), the Massachusetts Rideshare Regulation is an air quality initiative which requires the reduction of single-occupant commuter vehicle use. The Rideshare Regulation requires employers (businesses, academic institutions, and healthcare facilities) exceeding applicable employee thresholds to develop plans and set goals to reduce commuter drive alone trips by 25 percent from a baseline established through an employee survey. Additionally, any employers with 250 or more applicable commuters that are subject to the Massachusetts Air Operating Permit Program need to comply with this regulation. Compliance with the 25 percent drive alone commute trip reduction goal depends on the voluntary efforts of employees and there are no penalties if this goal is not accomplished.

The Rideshare Regulation was initially designed for all employers with over 250 applicable employees. However, due to funding and staff constraints at MA DEP, only employers with 1,000 or more applicable employees and employers with 250 or more applicable commuters that are subject to the Massachusetts Air Operating Permit Program are being asked to comply.

According to a report issued by A Better City in 2014[5] , 157 companies are presently reporting to MA DEP. Of these companies, 21 are not in compliance. Although MA DEP has estimated that, based on 2011 data, the Rideshare Regulation has resulted in the removal of 44,000 vehicles from Massachusetts roads, a comprehensive evaluation of the regulation's effectiveness has not taken place. This report also notes that MA DEP has nominally reported on the Rideshare Regulation's the level of success over the past two decades. In 2010, MassCommute conducted their own survey of employers required to comply with the Rideshare Regulation. Based on the survey, MassCommute concluded that the Rideshare Regulation's surveying and reporting process had no impact on employer efforts to recue drive alone trips.

In 2013, as part of a formal regulatory review process to streamline reporting and data collection agencywide, MA DEP evaluated whether the Rideshare Regulation's current incentives and TDM measures were still pertinent and considered other approaches that

[5] Establishing an Effective Commute Trip Reduction Policy in Massachusetts, A Better City, August 2014.

employers could implement to reduce emissions. One outcome from this review process is an agency desire to have online reporting along with a potential administrative fee.

MassCommute submitted their own proposal as part of this regulatory review process. A central recommendation of MassCommute's proposal is to strengthen the Rideshare Regulation by streamlining the MA DEP reporting process and requiring a full survey and report on attaining the drive alone trip reduction goal every five years instead of two. A streamlined reporting process would enable MA DEP to lower the threshold for employers from 1,000 employees. Another key recommendation from MassCommute is to allow employers to take credit for programs their employees participate in through TMAs and MassRides. Incorporating participation in TMAs and with MassRides is projected to increase the effectiveness and flexibility of the Rideshare Regulation. MassCommute's proposals are currently under review by MA DEP.

Appendix B *Massachusetts Rideshare Regulation – Reduction of Single Occupant Commuter Vehicle Use - Section 7.16 of 310 CMR 7.00 – Air Pollution Control Regulations*

Transportation Management Associations (TMAs)

TMAs are independent organizations formed and governed by their members who may include employers, developers, and property owners/managers in partnership with government entities. They work with stakeholders to establish policies, programs and services to address local transportation needs. TMAs realize their potential to reduce traffic congestion, improve air quality, and support economic development in their service areas through TDM strategies such as ridematching. TMAs advocate on behalf of their members for multimodal transportation system improvements and enhancements that improve access and mobility. TMAs are established within defined geographic areas to address the transportation needs of their members. As public-private partnerships, TMAs are funded through a combination of private sector funding (membership dues, fees, and grants) leveraged by public funding.

Model Bylaw

The American Planning Association's *Growing Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change,* contains a model bylaw addressing a full range of TDM measures and serves as a guide and framework for municipalities who want to adopt their own TDM bylaw. It is important to note that there is no single 'model' that can be adopted without some modifications. Municipalities should first examine their current development review and mitigation processes and adopt components of the model bylaw as appropriate. Another recommended approach is for municipalities to review similar Massachusetts bylaws and ordinances.

Appendix C *American Planning Association's Model Bylaw*

Massachusetts – Municipal Case Studies & Specific TDM Measures

This section summarizes case studies of TDM programs and measures currently implemented in municipalities across Massachusetts. The case studies include examples of parking and transportation management, developer responsibility for transportation mitigation, transportation mitigation funds, TDM policies, and required TDM measures in traffic studies. Specific TDM measures address bicycle parking and amenities, density bonuses, design standards, parking, required TMA membership, and participation in TDM programs.

It should be noted that while the City of Boston does implement TDM programs and measures, this report does not reference specific case studies. This is primarily due to the fact that Boston's zoning code is complex and comprised of numerous neighborhood and downtown districts. Additionally, if there is a development project that may be so large or unique that is cannot be reasonably approved using the existing zoning code, it then undergoes an Article 80 Project Review to determine density and use guidelines. TDM programs and measures are determined on a project-by-project basis as part of the Article 80 Project Review process.

Municipalities can refer to the case studies and TDM measures as a starting point for discussion to develop bylaws that best fit their own needs. Regardless of the TDM policies and programs and specific TDM measures a municipality may choose to implement, it is important that they be part of a cohesive vision for managing change that may result from new development.

It is worth mentioning that many of the following case studies and TDM measures are not implemented by-right. Rather, they are part of a municipality's Special Permit, Condition of Approval, or site plan review process.

Municipal Case Studies

Parking and Transportation Demand Ordinance - Cambridge

Introduced in 1998, the City of Cambridge has an ordinance linking parking and TDM. The Parking and Transportation Demand Management (PTDM) ordinance requires developers to reduce the drive alone rate for their development to 10 percent below the average rate for the census tract in which the development is located.

The PTDM ordinance requires all non-residential private developments to submit a full TDM plan with an annual review of their mode split if they add any new parking spaces greater than or equal to 5 spaces.[6] If the total number of spaces is between 5 and 19 the project is considered "small" and if the total number of spaces is 20 or greater the project is

[6] Residential developments are not covered under the ordinance. Instead, developers must conduct a traffic study for every residential structure over 50,000 square feet under a process covered by special permit.

considered “large.” Large projects are required to reserve 10 percent of parking as High Occupancy Vehicle (HOV) preferentially located spaces and construct bicycle parking equal to 10 percent of the parking supply. “Small” projects are required to implement at least three TDM measures.

A PDTM plan must commit to a certain maximum percent of trips to the site that will be made by people driving alone and is required to contain a comprehensive set of TDM measures. TDM commitments in a PTDM plan can include: transit pass subsidies, market-rate parking fees, shuttle buses, bicycle enhancements, guaranteed ride home, ridematching, bus shelters, and provision of an on-site TDM coordinator. All PTDM projects are required to join the local TMA. Only after a PTDM plan has been submitted and approved by the City can the developer or property owner obtain city permits (e.g., building permit, occupancy permit).

The PTDM ordinance has strict monitoring and reporting provisions. Monitoring of “large” projects includes employee and/or patron mode split surveys, biannual counts of parking occupancy and vehicular trips to and from the site, and status of the TDM measures. There is no evaluation requirement for “small” projects.

If single-occupant auto trip reductions are not being met, the City has the ability to enforce the requirements by either closing the parking facility or charging $10/space/day until the single-occupant auto share meets the targets. In a worst case scenario a developer’s parking facilities can be shut down by the City. The penalties for noncompliance serve as a strong incentive for developers or property owners to ensure that they are meeting their vehicle trip reduction targets.

Implementation of the PTDM ordinance has been credited with smaller parking facilities, less traffic generated by the regulated projects, improved air quality, and increased use of bicycling and public transit.

Appendix D *Cambridge’s Municipal Code - Parking and Transportation Demand Management Planning, Parking Space Registration - Chapter 10.18*

Mitigation Funds – Marshfield, Waltham, Woburn

Some municipalities require a monetary contribution from developers to mitigate or offset a development’s transportation impacts. While there are differences in what triggers a transportation impact, the revenue can be allocated towards advancing TDM measures. While various methods and accounting systems exist, the majority of mitigation funds in Massachusetts are executed as part of the special permit process and as one-time payments[7]. It is important to note that until the legislature explicitly authorizes the creation

[7] Municipalities in Massachusetts have referenced the authority of M.G.L. Chapter 40A, Section 9 to require mitigation when creating mitigation funds. There is no specific statutory mechanism for establishing them because there is no statutory authorization for charging mitigation fees. The legality of mitigation fees was established by the judiciary which has found that municipalities have the right to establish such fees pursuant to their home rule/police powers granted by the Massachusetts constitution. For further information, refer to *Morton v. Town of*

of mitigation funds or until there is a court ruling based off of a challenge to an existing fund, the legal viability of establishing mitigation funds is not yet fully settled[8].

If a municipality establishes a mitigation fund, expenditures need to directly relate to the impact created by the development to which it applies. Developers cannot be required to pay for existing deficiencies unless they are increased by the new development. If a municipal bylaw or ordinance is modified to include a mitigation fund, clear and succinct language should be included that:

- Specifies the purpose of creating the mitigation fund.
- Specifies the scope of what the mitigation funds will be spent on.
- Establishes a clear and proximate link between the impact of the development on the transportation network and how the mitigation funding will be used to remedy that impact.
- Develops concise and targeted TDM goals and requirements.
- Establishes a clear and well-defined process to monitor progress and compliance toward established goals (e.g., annual report or survey).
- Specifies a timeframe for the use of mitigation revenue and includes a clause for returning unspent fees.
- Holds the revenue in a specifically identified account that is monitored and reported on.
- Ensures a clear transfer of responsibility in the event of a change in ownership (i.e.; incorporate in deed, link to an occupancy permit).

An Act Promoting the Planning and Development of Sustainable Communities, legislation filed in January 2015 for the 2015-2016 session, is a draft bill supported by MAPC which proposes to update planning and zoning laws in Massachusetts in order to encourage new jobs and housing, strong community planning and public health, and natural resource protection. The draft bill takes a balanced approach that introduces more certainty and predictability for developers and property owners, while also granting cities and towns the tools necessary to shape the future of their communities. This proposed bill offers options to communities to enhance their local regulations by providing them with explicit authority to

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Hanover, 43 Mass. App. Ct. 197, 201 (1997) (upholding impact fee for water main connections) and *Town of Winthrop v. Housing Auth.*, 27 Mass. App. Ct., 645,647 (1989) (upholding impact fee for common sewer connections).

[8] According to the Attorney General (AG), revolving funds are authorized pursuant to G.L. c. 44 § 53E ½. In accordance with this law, revolving funds are required to be established and renewed annually by Town Meeting vote. Each town meeting has the power to decide whether or not to authorize a revolving fund for the upcoming fiscal year and, if so, what particular receipts will be credited to the fund and how the funds may be spent. For further information, refer to AG decision – Hanover Annual Town Meeting of May 5, 2014 – Case #7201.

implement new zoning methods and permitting processes. This proposed legislation specifically advances the implementation of TDM measures in two areas:

Development Impact Fees
Establish a clear and predictable process for assessing impact fees to cover eligible impacts such as traffic, stormwater, and water supply.

Planning Ahead for Growth Act
Grants additional tools and incentives to communities that choose to "opt-in" by making four specific zoning changes consistent with the state's Sustainable Development Principles. These benefits include: broader use of impact fees, development agreements, natural resource protection zoning, shorter vesting periods, the ability to regulate the rate of development, and priority for state infrastructure funding.

If adopted, this legislation will enable municipalities to require monetary contributions from developers to mitigate transportation impacts for a municipality as a whole. Municipalities will not be limited to implementing this type of mitigation for individual sites as part of a special permit process.

Mitigation with Traffic Impact Study - Marshfield
During the development of a large industrial park off Route139 in Marshfield, the Town created a transportation mitigation component to a special permit section of the zoning bylaw to ensure that costs for roadway and intersection improvements in the area were shared by the developer and the Town. Based on the anticipated build-out of the industrial park, the Town identified improvements along Route 139 to accommodate additional vehicle trips. The mitigation funds collected from new development in the industrial park were placed into a fund that was eventually used to pay for the design of the Route 139 improvements. The mitigation requirements and/or dollar value contribution to the mitigation fund is based on the location of the development, significance of the transportation impacts, and negotiations between the Planning Board and the developer.

Within the current zoning bylaw, Article XI Special Permit Conditions, Section 11.10 describes when a traffic impact analysis is required for any new development. The bylaw requires a traffic impact analysis for any development that requires a Special Permit for a principle use within the B-1, B-2, or I-1 zoning districts, or that would have an anticipated average peak hour trip generation in excess of 80 vehicle trip ends, or an average weekday generation in excess of 800 vehicle trip ends.

Generally, the developer is required to make improvements to the transportation network which will minimize traffic and safety impacts, and not degrade the Level of Service (LOS) at nearby intersections below the level of D. If the development will have primary impacts on Route 139, the developer may be required to contribute to a traffic mitigation fund at least equal to $300.00 per parking space.

Appendix E Marshfield's Zoning Bylaw – Special Permit Conditions – Traffic Impact Study - Section 11.10

Traffic Safety and Infrastructure Maintenance Fund - Waltham

As part of the filing of an application for a Special Permit, the City of Waltham requires developers to contribute to a Traffic Safety and Infrastructure Maintenance Fund if the proposed development exceeds the allowable Floor Area Ratio (FAR). Section 3.5.of Waltham's Zoning Ordinance contains a detailed FAR table based on land use which differentiates between FAR As of Right and FAR Maximum Allowed by Special Permit.

The rate of contribution to the Traffic Safety and Infrastructure fund is $3 per square foot of gross floor area of a building whose primary use is for office or retail and $1 per square foot of gross floor area of a building whose primarily use will be for multifamily dwelling units in any residential development of 10 or more units or as a research laboratory or structure or for industrial, manufacturing, warehousing, product and material distribution or similar purposes.

The Traffic Safety and Infrastructure Maintenance Fund can be expended only by the direction and approval of the City Council for the purposes of maintaining and improving the traffic safety infrastructure in the City. Specific types of expenditures include traffic regulation and control, road improvements (including widening), streetlighting, sidewalks and other public services related to the maintenance of traffic safety and safe public utilities, including new construction where needed. The City's Traffic Engineer is responsible for administering the funds.

Appendix F *Waltham's Zoning Ordinance - Traffic Safety and Infrastructure Maintenance Fund – Section 3.539*

Traffic Safety and Infrastructure Fund - Woburn

The City of Woburn has a zoning code which is intended to ensure that the City's infrastructure is upgraded and maintained in a responsible manner consistent with state and municipal laws and that major developments bear a proportionate share of capital facilities costs.

In lieu of an applicant performing all or part of the mitigation measures which have been made a condition of the Special Permit, the Special Permit Granting Authority may, at its sole discretion, require the applicant to make a contribution to the Traffic Safety and Infrastructure Fund. The contribution to this Fund is equal to 3 percent of the total development costs of the proposed project.

The Traffic and Safety and Infrastructure Fund is kept in a separate account in the City Treasury. Any revenue in this Fund can only be expended at the direction of the City Council with approval from the Mayor. The City Engineer administers the Fund. The applicant is required to pay all contributions into the Fund prior to the issuance of a permanent occupancy permit.

Additionally, the applicant must agree to participate in the area TMA and implement a TDM program. The TDM program specifically includes the assignment of an

Employee Transportation Coordinator to work with the area TMA and employees to encourage ridesharing and use of public transportation.

Appendix G *Woburn's Zoning Code - Traffic Safety and Infrastructure Fund - Section 18.7*

TDM Plan and Traffic Improvement Fee - Needham

Development in the New England Business Center (NEBC), Highland Commercial (HC)-128, and Mixed-Use (MU-128) Districts that seek a Special Permit to increase the floor area ratio over what is permitted by-right are subject to additional Special Permit Conditions as outlined in Section 6.8, Intensity of Use Special Permit Criteria.

The Planning Board determines the appropriate number of off-street parking spaces required to service the portion of the development which exceeds that permitted by-right. As outlined in Section 6.8.1(d), the Planning Board requires payment of a one-time Traffic Improvement Fee of $1,500 for each parking space. This fee, which is paid by the developer, is placed in a Traffic Mitigation Fund. Revenue from this fund is to be used for the purpose of addressing long term traffic improvements clearly related to and directly benefiting the uses within the area covered by the District Plan.

The Planning Board also has the discretion to require at least one or more TDM programs to reduce morning peak hour volumes. The TDM programs are listed as follows:

- Provide staggered work hours for at least 10 percent of the non-management work force;
- Provide preferential carpool parking locations for all employees;
- Provide a cash incentive for all carpools of two or more licensed drivers. The incentive shall be at least $40 per month per carpool;
- Provide a shuttle or van service to and from public transportation terminals. The service must have the capacity to accommodate at least 10 percent of the employees on the largest shift;
- Provide a work at home option for at least one day per week for at least 10 percent of the total work force;
- Provide subsidized public transportation passes of at least 20 percent of the monthly pass cost; and
- Other programs designed by the project applicant and approved by the Planning Board in lieu of or in addition to those listed above.

In addition, all TDM plans are subject to review by the Planning Department every two years for compliance with previously approved TDM program terms and measures.

Appendix H *Needham's Zoning Bylaw – Intensity of Use Special Permit Criteria for the NEBC, HC-128, and MU-128 Districts – Section 6.8*

Local Option Meals Tax to Support Fixed-Route Shuttle Service - Acton

Massachusetts law provides any city or town the ability to impose an excise of 0.75% on the sales of restaurant meals originating within the municipality by accepting Chapter 64L, Section 2(a). The local option tax would be $.75 on a $100 restaurant bill.

At its Annual Town Meeting held on April 2015, Acton voted to impose a local meals excise tax upon the sale of restaurant meals originating within the Town and voted to allocate revenue from the Local Option Meals Tax to the operation of a town-run fixed-route shuttle service. Approximately half of the costs to operate the new shuttle service will come from the Local Option Meals Tax and the other half from the Lowell Regional Transportation Association.

The Town of Acton also voted to accept the provisions of Chapter 44, Section 53F½ of the General Laws to establish a Transportation Enterprise Fund from which all transportation programs will operate. An Enterprise Fund gives communities the flexibility to account separately for all financial activities associated with a broad range of municipal services for which a fee is charged in exchange for goods or services.

The Transportation Enterprise Fund will serve as a transparent mechanism to show where the revenue from the Town's various transportation programs will be retained. Other transportation programs which will be included in the Transportation Enterprise Fund include the Council on Aging Van, MinuteVan transportation services, the Dial-A-Ride (General Population), Rail Shuttle (Commuters), and the Road Runner service (Seniors and People with Disabilities).

Mitigation Stabilization Fund – Dedham

Under the provisions of Massachusetts General Laws Chapter 40, Section 5B, municipalities can establish multiple stabilization funds and assign a different purpose to each. Creation of the mitigation stabilization fund, and an appropriation to the fund, requires a two-thirds vote of a city council, town meeting, or similar committee. The vote must clearly define the purpose of each fund established.

Developers or parties who have an agreement with the Town of Dedham that includes mitigation payments, infrastructure charges or other payments in connection with a regulatory activity or a municipal contract, permit application, or bylaw make payments to the Town's Mitigation Stabilization Fund. Comprised of 5 members, the Town's Mitigation Funds Committee makes recommendations to the Town regarding the expenditure of funds on deposit in the Mitigation Stabilization Fund. Subsequently, the Town Manager proposes a plan regarding the expenditure of the Mitigation Stabilization Funds.

Appendix I Dedham's Town's Charter - Mitigation Funds Committee – Section 39-32

Density Bonus – Framingham

A density bonus is an incentive-based tool that permits developers to increase the maximum allowable development on a property in exchange for advancing community public policy goals. Increasing development density may allow for increases in developed square footage or in the number of developed units. Density bonuses work best in areas where growth pressures are strong and land availability limited or when incentives for attaining the goals outweigh alternative development options.

The Town of Framingham has special provisions under the Highway Overlay District Regulations. There are two overlay districts which fall under this section, the Regional Center (RC) district and the Highway Corridor (HC) district. Within these two districts there are incentives which allow a development to exceed the density restrictions of the underlying zoning in return for providing public amenities which compensate for one or more specific impacts of increased density. These amenities may include traffic improvements, pedestrian or transit improvements, and creation of additional open space.

In the RC district, the Planning Board may grant by Special Permit an increase in the FAR for new construction above the existing maximum of 0.32 up to a maximum of 0.40. In granting an increase in the FAR, the Planning Board shall make a specific finding in writing that the increase shall not be substantially more detrimental to the neighborhood than the existing structure or use. In addition, the developer must provide public benefit amenities such as pedestrian circulation improvements, public assembly space, traffic improvements, or transit amenities. The amenities provided must adhere to a Schedule of Bonuses table. The Schedule of Bonuses table lists the ratios indicating how many square feet of new development is equal to square feet or dollars of public amenities.

Schedule of Bonuses

Public Benefit Amenity	Amenity Unit	Bonus Ratio*
Open Space Amenities		
Park	Square foot	1:1
Excess Pervious Landscaping	Square foot	1:0.5
Pedestrian Circulation Improvements		
Off-Site Sidewalk	Square foot	1:1
Pathway/Bikeway	Square foot	1:1
Pedestrian Bridge/Tunnel	Square foot	1:1
Public Amenity Space	Square foot	1:5
Traffic Improvements		
Service Road (24-30 foot paved width)	Square foot	1:3
Transit Amenities		
Transit-related Lane Widening	Square foot	1:2
Public Transit Endowment	Dollar ($)	20:1

**Note: BONUS RATIO = Amenity: Floor Area*

Appendix J Framingham's Zoning Bylaw - Highway Overlay District Regulations - Section III.E

Transportation Management Overlay District (TMOD) - Lexington

In 2009, the Town of Lexington approved an increase in the amount of development allowed for the Hartwell Avenue Corridor. Realizing that increased development would have an impact on the overall transportation network in this corridor, the Town moved to adopt an overlay district that would link the transportation impacts of development to specific mitigation measures. This overlay district is referred to as a Transportation Management Overlay District (TMOD). The TMOD process includes a specific set of regulations and fee structures for a development which makes the process more streamlined and predictable.

TMODs can be established in other areas of Lexington where development impacts are deemed to have a degrading impact on the transportation network and quality of life for residents. In order to establish a TMOD, a Transportation Plan needs to be completed that includes the following components:

- Cost projections for transportation infrastructure improvements required to address the impacts generated by the anticipated development in the TMOD;

- Required transportation mitigation fees;

- Parking and TDM techniques reasonably calculated to reduce the number of vehicle trips generated by developments in the TMOD and to ensure the long term stability of the transportation system; and

- Plan to encourage voluntary participation in TDM programs by those not required to participate.

As part of the TMOD process, the developer must create a full or partial Parking and Transportation Demand Management Plan (PTDM) depending on the size of the development. A PTDM must address specific demand management techniques that will be utilized to reduce SOV trips (e.g., membership in a TMA) and parking. Developers are required to submit annual reports to the Town that include information on employee/patron mode split, the results of the PTDM measures, and goal attainment.

The Town of Lexington created a transportation mitigation fee structure for development as well. The fee is the sum of $5.00 for every square foot of increased net floor area above the FAR listed under the base zoning. The transportation fees collected from new development in the TMOD are put into an account that is used to pay for the design and improvements to the transportation network to further the goals of the plan established for the TMOD[9].

Appendix K *Lexington's Zoning Bylaws – Transportation Management Overlay District – Section 135-7.0*

TDM Policy - Lexington

The Town of Lexington's Planning Board adopted a TDM Policy in 1997. The TDM Policy focuses on meeting Lexington's transportation needs by a variety of measures that affect the demand for, and use of, various modes of travel rather than changes in the supply of transportation facilities, such as the construction of roadways and multi-level off-street parking facilities.

The Policy seeks to reduce the use of automobiles, particularly SOV, in order to:

- Permit vehicular traffic on Lexington streets to move in an efficient manner without excessive delay or congestion;

- Reduce motor vehicle and pedestrian accidents on the town's streets;

[9] The City of Rockville, Maryland also has a TDM fund. Revenue for the TDM fund is collected as a developer fee which is based on $0.10 per square foot for commercial and retail developments and $60 per unit for residential developments.

- Permit emergency vehicles to reach homes and businesses with a minimum of delay;

- Reduce the awareness of and impact from vehicular traffic on a predominantly residential town;

- Promote safe and convenient routes for pedestrians and bicyclists;

- Promote cleaner air and reduce automotive exhaust emissions caused by vehicles standing and idling for an excessive time; and

- Maintain a balance between the traffic generating capacity of businesses and residential development in the town and the traffic carrying capacity of streets and intersections.

The TDM Policy also seeks to:

- Assure adequate opportunities for mobility for all Lexington residents, workers and visitors; and

- Expand the Town's inventory of data about transportation needs and transportation utilization.

The TDM Policy seeks to aid Lexington businesses and other establishments to:

- Reduce the cost of operations for Lexington companies and establishments caused by delays in vehicular traffic;

- Expand the pool of potential employees who can reach places of work in Lexington more easily and economically;

- Employ a more efficient and satisfied work force less concerned at the work place by the frustrations of transportation, particularly commuting;

- Permit potential customers and clients to reach places of business in Lexington more easily and economically; and

- Provide transportation services more effectively in collaboration with other businesses and with the Town.

The provisions in the TDM Policy are voluntarily offered by the developer and are not regulatory measures imposed by the Town.

Appendix L Lexington's Transportation Demand Management Policy

Trip Reduction Plan - Hadley

The Town of Hadley has trip reduction measures in their zoning bylaw for Commercial Site Plan Approval. The bylaw requires that any new building or new use of a building in excess of 10,000 square feet submit a Trip Reduction Plan. The Trip Reduction Plan needs to clearly identify a combination of transportation system management strategies designed to reduce anticipated vehicle trips by 35 percent and outline TDM measures. TDM measures include vanpool/carpool incentive programs, on-site bicycle storage and locker facilities, and encouragement of employee and customer use of transit services. Additionally, the Planning Board may reduce minimum parking standards by a percentage for developments that make a long-term commitment to promoting employee and public use of transit, ridesharing, and other means of reducing SOV trips.

Appendix M *Hadley's Zoning Bylaw - Commercial Development and Performance Standards – Section 8.8*

Required TDM Measures in Traffic Studies – Belmont and Braintree

Town of Belmont

The Town of Belmont requires the identification of a project's traffic impacts through a traffic study along with a TDM plan for projects in the Belmont Uplands District. At a minimum, the TDM plan needs to consider ridesharing programs, alternative work schedules, public transportation (e.g., subsidized passes for public transportation and consultation with public transit authorities to establish bus service to the project site), and bicycle facilities (e.g.; inclusion of bicycle racks and/or bicycle storage lockers as well as showering facilities). Subsequently, the traffic impacts and TDM plan need to be appropriately mitigated by the developer.

Appendix N *Belmont's Zoning Bylaw – Design and Site Plan Review for the Belmont Uplands District – Section 6B.6*

Town of Braintree

The Town of Braintree requires the preparation of a Traffic Study for any project that will generate 50 or more new trips during the peak hour for a proposed development. Prior to granting a Special Permit or a Site Plan Review, the Special Permit Granting Authority determines if there will be adequate capacity on all impacted streets and whether mitigation measures may be required. The Town's zoning bylaw outlines specific criteria for measures to mitigate traffic impacts in the Traffic Study.

Appendix O *Braintree's Zoning Bylaw – Traffic Study – Section 135-1404*

Reduction in Number of Required Spaces – Chelmsford

The Town of Chelmsford allows for the reduction of 25% required parking if a property owner can demonstrate a decreased if specific criteria are met under 'Base Parking Reduction Methods.' Up to 50% of required parking can be reduced if there is Payment to Public Parking Fund, Public Parking Reserve, or Traffic Circulation and Pedestrian Safety Improvement Incentives. Details of this zoning bylaw are described below.

Base Parking Reduction Methods

The Town of Chelmsford's Zoning Bylaws specify that up to a maximum of 25% of required parking can be reduced with a special permit from the Planning Board if a property owner can demonstrate that the required number of spaces will not be needed for the proposed use and that fewer spaces meet all parking needs. Such cases might include:

- Use of a shared/common parking lot for separate uses having peak demands occurring at different times;
- Age or other characteristics of occupants which reduce their auto usage;
- Peculiarities of the use that make usual measures of demand invalid;
- If the use is located adjacent to a public right-of-way where striped on-street parking is available;
- If an off-street public parking lot of 20 spaces or more exists within 300 feet of the principal land use;
- If a private off-street parking lot with sufficient space for long-term parking is within a 700 foot walking distance of the principal land use;
- Proximity to public transportation; or
- Other transportation mitigation programs such as car-sharing, carpooling, shuttle service, on-site bicycle commuter services, or other programs.

Additional Parking Reduction Methods

In addition to the parking reductions outlined in the Base Parking Reduction Methods, required parking may be reduced up to a maximum of 50% with a special permit from the Planning Board if one or more of the following methods is utilized for reducing the required number of parking spaces.

- Payment to a Public Parking Fund
- Public Parking Reserve
- Traffic Circulation and Pedestrian Safety Improvement Incentives

Permanently eliminating and/or significantly reducing the width of existing curb cuts in a manner that improves the pedestrian safety and access control on a primary public street;

Providing a perpetual agreement for one or more driveway consolidations or interconnections that will alleviate traffic on a primary street and facilitate shared use of off-street parking;

Providing an internal sidewalk with connections to the primary use entrance, on-site parking area, the adjacent public sidewalk and adjacent uses; or

Providing public access through a permanent easement to the Bruce Freeman Trail or the Beaver Brook and bike racks to accommodate at least two bicycles per eliminated parking space.

Appendix P *Chelmsford's Zoning* Bylaws - *Reduction in Number of Required Spaces – Article 5 – Section 195-18*

Specific TDM Measures

Bicycle Parking and Amenities – Arlington, Cambridge, Norwell

The amount and type of bicycle parking and amenities required depend on the site and the users. Short-term users (e.g., shoppers) need convenient parking close to building entrances whereas long-term users (e.g., employees) prefer security and protection from the elements for their bicycles. Arlington, Belmont, Cambridge, and Norwell all have bicycle parking requirements for new developments in their bylaws. The key components of these requirements are described below:

Town of Arlington

The Town of Arlington requires bicycle parking spaces for developments subject to Environmental Design Review (Section 11.06). The required number of bicycle parking spaces is based on the number of motor vehicle parking spaces which have been permitted by the Special Permit Granting Authority.

- If there are fewer than 8 motor vehicle parking spaces provided by Special Permit, bicycle parking is not required.

- When bicycle parking is required, there will be one bicycle parking space per fifteen motor vehicle spaces.

- When bicycle parking is required, there will be a minimum of 2 spaces provided. However, not more than 20 bicycle spaces will be required at a single site.

Appendix Q *Arlington's Zoning Bylaw – Bicycle Parking – Section 8.13*

City of Cambridge

The City of Cambridge requires bicycle parking for new development and redevelopment projects through its zoning. As stated in Article 6.100 of Cambridge's zoning bylaws, the purpose of bicycle parking is to "support the ongoing viability of bicycle travel as a transportation option that mitigates the impact of automobile use." Locations and types of bicycle parking must be shown in building site plans and approved by the City. Article 6.100, distinguishes between Long-Term and Short-Term bicycle parking and where each of these parking types should be located. The zoning bylaw references the City of Cambridge Bicycle Parking Guide for illustrations of acceptable bicycle rack design and layout and access standards to bicycle parking spaces.

Article 6.100, Section 6.107, Required Quantities of Bicycle Parking, provides schedules for calculating the required minimum quantities of Long-Term Bicycle and Short-Term Bicycle Parking Spaces. Each rate shall be multiplied by the intensity of the applicable land use or uses, measured in Gross Floor Area, number of dwelling units, or other specified unit of measurement. The total number of bicycle parking spaces required shall be the sum of the required Long-Term Bicycle Parking Spaces and Short-Term Bicycle Parking Spaces. Any Bicycle Parking Space that meets the requirements for both Long-Term Bicycle Parking and Short-Term Bicycle Parking may contribute to the minimum requirement for one type or the other, but not both. The schedules of the Long-Term and Short-Term Bicycle Parking Requirements are provided in the following tables:

Minimum Long- and Short- Term Bicycle Parking Rates based on Residential Uses

Category	Included Residential Uses	Minimum Long-Term Bicycle Parking Rate	Minimum Short-Term Bicycle Parking Rate
R1	Single-family dwellings, existing single-family dwellings converted for two families, two-family dwellings, rectory or parsonage	No minimum	No minimum
R2	Townhouse dwellings, multifamily dwellings, trailer park or mobile home park	1.00 space per dwelling unit for the first twenty (20) units in a building; 1.05 spaces per dwelling unit for all units over twenty (20) in a building	0.10 space per dwelling unit on a lot
R3	Elderly oriented housing, elderly oriented congregate housing	0.50 space per dwelling unit	0.05 space per dwelling unit
R4	Group housing, including: lodging houses,, dormitories, fraternities and sororities	0.50 space per bed	0.05 space per bed
R5	Transient accommodations, including: tourist houses in existing dwelling, hotels, motels	0.02 space per sleeping room	0.05 space per sleeping room

Minimum Long-Term Bicycle Parking Rates based on Non-Residential Uses

Category	Included Non-Residential Uses	Minimum Long-Term Bicycle Parking Rate
N1	Offices, including: medical, professional, agencies, general, government, radio/television studios, arts/crafts studios	0.30 space per 1,000 square feet
N2	Technical offices, research facilities	0.22 space per 1,000 square feet
N3	Hospitals and clinics; veterinary clinics, public safety facilities, restaurants and eating establishments	0.20 space per 1,000 square feet
N4	Retail stores, consumer service uses, commercial recreation and entertainment	0.10 space per 1,000 square feet
N5	Transportation and utility uses; religious and civic uses; manufacturing, storage and other industrial uses, auto –related uses	0.08 space per 1,000 square feet
E1	Primary or secondary schools, vocational schools	0.30 space per classroom or 0.015 space per auditorium seat, whichever is greater
E2	College or university facilities (excluding residences)	0.20 space per 1,000 square feet
P	Automobile parking lots or parking garages for private passenger cars	1.00 space per 10 motor vehicle parking spaces

Minimum Short-Term Bicycle Parking Rates based on Non-Residential Uses

Category	Included Non-Residential Uses	Minimum Short-Term Parking Rate
N1	Convenience and food stores, restaurants and eating establishments, theaters and commercial recreation	1.00 space per 1,000 square feet
N2	Retail stores and consumer service establishments	0.60 space per 1,000 square feet
N3	Passenger transportation; religious and civic uses; government offices, medical offices and clinics, agency offices, banks (ground floor only); veterinary clinics	0.50 space per 1,000 square feet
N4	Hospitals and infirmaries	0.10 space per 1,000 square feet
N5	Non-passenger transportation and utility uses; laboratories and research facilities;, professional and technical offices; radio/television and arts/crafts studios; manufacturing, storage and other industrial uses; auto-related uses	0.06 space per 1,000 square feet
E1	Primary or secondary schools	1.70 space per classroom or 0.085 space per auditorium seat, whichever is greater
E2	College or university academic or administrative facilities	0.40 space per 1,000 square feet
E3	College or university student activity facilities	1.00 space per 1,000 square feet
P	Automobile parking lot or parking garage for private passenger cars (6.36.2 b)	No additional requirement for Short-Term Bicycle Parking; however, if motor vehicle parking is provided on an open lot, then required Long-Term Bicycle Parking Spaces may be converted to Short-Term Bicycle Parking Spaces

Appendix R Cambridge's Zoning Ordinance – Bicycle Parking – Section 6.100

Town of Norwell

For parking areas of 10 or more spaces, bicycle racks facilitating locking shall be provided to accommodate one bicycle per 20 parking spaces. No more than 2 bicycle racks shall be required regardless of parking lot size.

Appendix S Norwell's Zoning Bylaws - Bicycle Racks - Section 3157

Vehicle Parking in Exchange for Bicycle Parking

It is worth mentioning that Portland, Oregon allows reductions to vehicle parking in exchange for bicycle parking. Bicycle parking may substitute for up to 25 percent of required parking. For every 5 non-required bicycle parking spaces that meet bicycle parking standards, the vehicle parking requirement is reduced by 1 vehicle space. In addition, a bicycle sharing facility can substitute for required parking.

Appendix T *Portland, Oregon - Zoning Code – Exceptions to the Minimum Number of Parking Spaces – Section 33.266.110 – E.3 and E.7*

Parking

The provision and management of parking can have a significant influence on a development's vehicular trip generation and the overall transportation system. There are various parking management strategies that contribute to reducing and managing the supply of available parking. This section outlines the following TDM measures: active first floor uses for parking garages, fees-in-lieu of parking, flexible parking, parking reserves, location of parking, parking maximums, parking reductions, parking restrictions, and shared parking.

Fees-in-Lieu of Parking – Northampton, Oak Bluffs

Where zoning requirements for minimum numbers of parking spaces exist, a fee in-lieu of parking can reduce parking supply for dense mixed-use areas. Fees-in-lieu allow developers to pay a fee (annual or one-time) into a municipal parking or traffic mitigation fund in lieu of providing the required parking on site. The fees can then be used for transportation improvements or 'banked' to fund current or potential future shared parking facilities. By discouraging each development from providing its own separate parking facility, a fee-in-lieu system can improve the overall efficiency of parking provision by addressing the needs of the area as a whole, rather than the needs of each individual site.

Fees in-lieu can be established as a flat rate per parking space not provided or per square foot of floor area, or through a case-by-case determination for the development as a whole. Fees may be imposed as a property tax surcharge or charged when a development is permitted. The actual fee varies among municipalities.

City of Northampton

The City of Northampton requires developers to demonstrate that all cumulative and incremental traffic impacts have been mitigated. If those impacts are not mitigated, the Planning Board shall require in-lieu-of payments to fund a project's proportional share of necessary improvements to mitigate off-site traffic impacts, including provision of public transit and pedestrian or bicycle paths, in lieu of requiring off-site improvements. All in-lieu-of payments will be expended with the approval of the Mayor and City Council. In-lieu-of traffic mitigation payment shall be assessed by the Planning Board after a fact-based analysis of a specific project but shall not exceed a required payment on a per peak trip basis. The required per peak trip payment

ranges from $1,000-$3,000 depending on project location. Past experience has been that mitigation of all traffic impacts would be higher than the maximum amount allowed and so many projects are assessed the maximum allowed by a table which is outlined in the zoning bylaw.

Appendix U *Northampton's Zoning Code – Allowance of Reduced Parking Requirements – Section 350.11 – Site Plan Approval and Section 350 - 8.10 – Approval Criteria*

Town of Oak Bluffs

The Town of Oak Bluffs allows uses proposed for the B-1 Business District that are unable to meet the off-street parking requirements to make a payment in-lieu of providing the spaces. The payments are annual per space and depend on the number of required spaces. In general, the in-lieu fee ranges from $50 to $100 per space each year. Payments go to the Oak Bluffs B-1 District Parking Mitigation Trust.

Appendix V *Oak Bluffs' Zoning Bylaws – Off-Street Parking Requirements – Special Permit in the B-1 District – Section 5.1.5*

Parking Reserves – Acton, Cohasset, Dennis, Marlborough, Sudbury

Parking reserves require new developments to pave a reduced number of parking spaces, but hold sufficient land in reserve to provide additional parking spaces that might be required in the future. As long as the additional parking is not needed, the land can be landscaped or used for other amenities such as playgrounds or parks. This technique is effective in phased developments or for uses where parking demand is uncertain.

This approach has several advantages. First, it addresses concerns about the site being able to provide adequate parking. Second, it defers or foregoes entirely the costs of building a portion of the parking. Third, it highlights the tradeoffs between parking and other amenities.

Several municipalities in Massachusetts (e.g., Acton, Marlborough, Cohasset, Sudbury, and Dennis) have regulations allowing parking spaces to be held in reserve, with variations on how the reduction may be authorized (e.g., Board of Selectmen, Planning Board), what type of development review is necessary (e.g., Site Plan, Special Permit), and the maximum reduction allowed.

Town of Acton

Under a Site Plan Special Permit, the Board of Selectmen may authorize a maximum reduction of 75 percent of the total number of spaces.

Appendix W *Acton's Zoning Bylaw – Reserve Parking Spaces – Section 10.4.4*

City of Marlborough
The City of Marlborough allows the use of temporary parking reserves in cases where there will be a reduced parking demand for at least a year, such as with a large phased development. Reductions of up to 50 percent of the requirement are allowed subject to Site Plan approval.

Appendix X Marlborough's Zoning Ordinance - Off-Street Parking – Section 650-48B(4)

Town of Cohasset
The Town of Cohasset has a maximum reduction of not more than 33 percent of the required parking space. This decision is based on the discretion of the Planning Board as part of a Site Plan review.

Appendix Y Cohasset's Zoning Bylaws – General Parking and Loading Regulations – Section 7.2(10)

Town of Sudbury
The Town of Sudbury has a maximum reduction 30 percent. The reduction may be granted by the Board of Selectmen upon the issuance of a Special Permit.

Appendix Z Sudbury's Zoning Bylaws – Reserve Parking Spaces – Section 3113

Town of Dennis
There is no maximum parking reduction in the Town of Dennis. This decision is determined by the Planning Board as part of a Site Plan Special Permit.

Appendix AA Dennis' Zoning Bylaws – Off-Street Parking and Loading Requirements – Section 3.1.7.4

Location of Parking – Acton, Bedford, Beverly, Cambridge, Millis, Stoughton

Parking in front of buildings where it is most visible from the street requires that buildings be set back from the street. Doing so can detract from the pedestrian environment and make the area less comfortable for pedestrians. However, if parking is sited behind buildings pedestrian accessibility from sidewalks can be promoted. If buildings front directly on roadways, they can create an active and engaging environment where pedestrians can easily walk between buildings rather than driving.

Several municipalities in Massachusetts (e.g., Acton, Bedford, Beverly, Cambridge, Millis, and Stoughton) have regulations that restrict the location of parking.

Town of Acton

The Town of Acton's Special Provisions for the Village, Kelley's Corner and Powder Mill Districts prohibits parking between the front of a building and the street.

Appendix BB Acton's Zoning Bylaw – Parking Standards – Special District Provisions - Section 6.9

City of Beverly

The City of Beverly prohibits accessory off-street parking within the front yard of any district (except for one- and two-family dwellings) and employee parking within the front yard in the City's restricted industrial, research and office district.

Appendix CC Beverly's Zoning Ordinance – Parking and Loading Requirements - Section 29-25

City of Cambridge

Section 6.44.1(c) of the City of Cambridge's zoning code states that "No on grade open parking space shall be located within a required front yard setback."

Appendix DD Cambridge's Zoning Ordinance – Design and Maintenance of Off-Street Facilities – Section 6.44.1(c)

Bedford, Millis, Stoughton

The bylaws defining specific locations and land uses in Bedford, Millis, and Stoughton include language encouraging the strategic location of parking: "To maintain a pedestrian-friendly environment, motor vehicle parking spaces shall be located behind or beside buildings to the maximum extent possible. Motor vehicle parking shall not be located directly between the building and the street alignment."

Appendix EE Bedford, Millis, and Stoughton – Zoning Bylaws – Vehicle Parking Bedford – Sections 17.5.11 and 18.5.11, Millis – Section 4.11, Stoughton – Sections 7.2 and 7.4.1

Parking Maximums – Bedford and Belmont

Parking maximums restrict the total number of spaces that can be constructed and establish an upper limit or cap on parking supply. Applying parking maximums can result in limiting traffic and the amount of land allocated for parking.

Town of Bedford

The Town of Bedford has maximum parking allowances for certain uses that include educational, housing for the elderly, mixed uses, and child care facilities.

Appendix FF Bedford's Zoning Bylaws – Parking Regulations – Required Spaces – Section 7.4.1

Town of Belmont

The Town of Belmont has maximum numbers of parking spaces allowed for each subdistrict of the McLean Hospital property and in the McLean District.

Appendix GG Belmont's Zoning Bylaw – Maximum Number of Parking Spaces – Section 6.A.3.1

Parking Reductions and Restrictions – Braintree, Gloucester, Ipswich, Northampton

Reducing and restricting the supply of parking is strongly related to the number of vehicular trips and roadway congestion.

Town of Braintree

The Town of Braintree allows reductions in required parking as part of a special permit or site plan review. A parking study needs to be completed that determines whether the parking to be provided will be adequate.

Appendix HH Braintree's Zoning Bylaws – Decreases in Parking Requirements – Section 135-803

City of Gloucester

The City of Gloucester does not require parking for business and municipal uses within 400 feet of a municipal parking facility.

Appendix II Gloucester's Zoning Ordinance – Off-Street Parking – Section 4.1

Town of Ipswich

The Town of Ipswich does not require parking for developments in the CBD or within 500 feet of municipal parking.

Appendix JJ Ipswich's Protective Zoning Bylaw – Municipal Parking Lot Exemption - Section VII.I.

City of Northampton

Northampton allows parking requirement reductions up to 20 percent for employee parking on major projects (350-8.6) through site plan review. The City also requires a trip-reduction plan through Site Plan Review for new commercial, office and industrial buildings or uses over 10,000 square feet (350-11.5.B.(3)b).

Appendix KK Northampton's Zoning Code – Shared Parking (Section 350-8.6) and Site Plan Approval (350-11.5.B.(3)b)

Shared Parking – Marlborough, Stoneham, Waltham, Westfield

Shared parking is a parking lot or facility that serves multiple destinations and enables a reduction of overall parking supply and vehicular trips. Shared parking can be especially effective in mixed use developments, either when there is a mix of uses on a single site or when sites with different uses are located close together and have different periods when parking demand is highest (e.g.; an office building sharing parking with a restaurant or movie theater).

City of Marlborough

The City of Marlborough allows shared parking in all districts for uses with different peak periods, allowing reductions of up to one-half of the minimum parking required for the uses separately. The City requires documentation of the reduced parking demand as well as additional provision of open space for each parking space not provided as a result of shared parking.

Appendix LL Marlborough's Zoning Ordinance – Off-Street Parking - Section 650-48.B-3

Town of Stoneham

Stoneham allows shared parking by special permit with the approval of the Planning Board. Up to 50 percent of required spaces may be shared with uses having different operating hours. The parties are required to sign a joint use agreement.

Appendix MM Stoneham's Zoning Bylaws – Special Permits for Off-Street Parking – Section 6.3.8.1

City of Waltham

In Waltham, parking requirements for any mixed use parcel or building are calculated by using a time table of parking requirements by use. Section 5.2, Off-Street Parking Requirements, of Waltham's General Ordinances provides a 'Parking Credit Schedule Chart' of parking requirements by use and time of day. This table is shown below.

Parking Credit Schedule Chart

Uses	Weekday			Weekend	
	Night Midnight to 7:00am (%)	Day 7:00am to 5:00pm (%)	Evening 5:00pm to Midnight (%)	Day 6:00am to 6:00pm (%)	Evening 6:00pm to Midnight (%)
Residential	100	60	90	80	90
Office/Industrial	5	100	10	10	5
Commercial Retail	5	80	90	100	70
Hotel	70	70	100	70	100
Restaurant	10	50	100	50	100
Restaurant Associated with Hotel	10	50	60	50	60
Entertainment/Recreation (theaters, bowling alleys, cocktail lounge)	10	40	100	80	100
Day-Care Facilities	5	100	10	20	5
All Other	100	100	100	100	100

Appendix NN Waltham's Zoning Code - Off-Street Parking Requirements – Section 5.2

City of Westfield

The City of Westfield's parking ordinance provides flexible standards and options. Downtown Westfield has a number of well utilized and maintained municipal lots behind its main street stores. The ordinance allows for shared off-site facilities within 300 feet of the uses. The Planning Board can also issue a Special Permit for the multiple use of individual spaces in accordance with an approved Parking Management Plan. The Plan must demonstrate that the peak parking demand generated by the uses occurs at different times, and that there will be adequate parking for the combined uses at all times.

Appendix OO Westfield's Zoning Ordinance - Shared Parking - Sections 7-10-3 and 7-10-7

TMA Membership and TDM Implementation - Woburn

The City of Woburn requires project applicants to participate in the regional or local TMA and implement TDM programs for projects that both require a special permit and are 15,000 square feet or greater in gross floor area.

Appendix PP Woburn's Zoning Ordinance – Traffic Safety and Infrastructure Fund – Section 18.7.8

TDM Related Measures

Although requiring first floor uses for parking garages or limiting the number and width of driveways and curb cuts are not considered to be TDM measures, both are design guidelines that advance pedestrian safety and comfort as well as enhance the character of the public realm. Implementing either of these design guidelines can indirectly reduce the frequency of SOV trips.

Active First Floor Uses for Parking Garages – Cambridge

Requiring first floor uses around a parking structure (e.g., newsstands, stores, coffee shops) keeps the area active at street level and maintains visual interest. It can also benefit the developer by providing an additional source of revenue through the lease or sale of this space.

In 2001, as part of a broader rezoning effort, the City of Cambridge revised its zoning code to exempt underground parking facilities from gross floor area calculations. The regulations state that the roof of an underground parking facility must not be more than 4 feet above the ground, and that it must be below either a non-parking structure or an open space amenity or pedestrian circulation area. This regulation strongly encourages active first-floor uses as well as underground parking.

Appendix QQ Cambridge's Zoning Ordinance - FAR Exceptions for Parking and Loading Facilities – Section 5.25

Driveway Curb Cuts – Dover and Marshfield

Driveway curb cuts are a major source of vehicle-pedestrian-bicycle conflicts and induce congestion on busy roadways due to turning vehicles. Limiting the number and width of driveways and curb cuts can reduce or eliminate locations where pedestrians and bicyclists are at risk of getting struck by vehicles. As a result, a safer and less congested environment is established. Allowing for the shared use of an access drive by two or more business owners can also help reduce the number of driveways and curb cuts along streets.

The purpose of Dover's, Chapter 196, Residential Driveways and Curb Cuts, is to "limit the potential area of traffic conflict and promote safety." Section 196-5, Guidelines for Location and Construction, outlines specific guidelines to locate driveway entrances to minimize points of traffic conflict between vehicles, pedestrians, and bicyclists.

Appendix RR Dover's Zoning Bylaws – Residential Driveways and Curb Cuts – Section 196-5

The Town of Marshfield's curb cut bylaw for projects undergoing special permit review contains standards that include issuing one curb cut per parcel, encouraging the sharing of curb cuts with adjoining parcels, and providing curb cuts on site streets, not major roadways, wherever possible.

Appendix SS Marshfield's Zoning Bylaw – Curb Cut Bylaw – Section 11.11

National – Municipal Case Studies, Specific TDM Measures and State Programs

This section contains descriptions of national case studies which are examples of successfully implemented TDM policies and programs. The case studies are on the state and municipal level, many of which utilize creative approaches. It is important to keep in mind that the case studies' policies and programs differ widely due to geographic location, unique transportation challenges, and availability of transit services. Most importantly, policies and programs which are implemented in one state will most likely have legal limitations in Massachusetts.

Municipal Case Studies

Commuter Benefit Ordinance – San Francisco, California

In 2008, the City of San Francisco adopted a Commuter Benefit Ordinance. The ordinance and TDM program implementation is based on the premise of developing partnerships between the public and private sectors. This ordinance requires all employers with 20 or more employees (including part-time, out of state, and temporary workers) to provide one of three commuter benefits:

1. Pre-Tax Transportation Benefit
A monthly pre-tax deduction, up to $130/month, to pay for transit or vanpool expenses.

2. Employer-Paid Transportation Benefit
A monthly subsidy for transit or vanpool expenses equivalent to the price of the San Francisco Muni Fast Pass (including BART travel), currently $80/month.

3. Employer-Provided Transportation
A company-funded bus or van service to and from the workplace.

In turn, the city provides a guaranteed ride home program, ride matching, and a bicycle share program to support employers. The basic premise of this ordinance is to promote incentives that make alternatives to SOV travel less expensive and more convenient. Unlike the majority of ordinances designed to reduce trips, San Francisco's ordinance is straightforward to implement and administer. Employers are not required to conduct surveys or complete extensive TDM plans. However, employers are subject to fines in the event of

violations. Fines range from $100 for the first violation, $200 for the second violation, and $500 for the third violation, up to a maximum of $800.

With over 9,000 employers subject to the Commuter Benefit Ordinance, the City is able to administer the program with 1.5 staff members, whose primary focus is on education and assistance, not compliance and enforcement. When evaluating the program, San Francisco has reported that an estimated 40 percent of employers have added a benefit program directly related to the ordinance.

Appendix TT *San Francisco, California - Commuter Benefits Ordinance*

TDM Ordinance – South San Francisco, California

The City of South San Francisco's Zoning Ordinance comprehensively addresses TDM measures for new non-residential developments expected to generate 100 or more daily trips[10] or projects seeking a floor area ratio bonus. All projects subject to this zoning ordinance are required to incorporate TDM measures that demonstrate reducing the number of trips to achieve a minimum alternative mode use of 28 percent or greater.

South San Francisco's ordinance requires a comprehensive process, in terms of the range of project applicants impacted, the TDM measures considered, and the monitoring and reporting requirements that must be met.

Trip reduction measures specified in the ordinance include the following:

- Ride matching services for carpools and vanpools;
- Designated employer contact to administer the trip reduction program for that employer;
- Provide direct routes to transit;
- Guaranteed ride home program;
- Information boards and kiosks;
- Passenger loading zones;
- Pedestrian connections to external streets;
- Promotional programs;
- Free showers and clothes lockers;
- Shuttle program; and
- Transportation management association.

The ordinance also outlines additional measures that a project applicant may choose from:

- Alternative commute subsidies/parking cash out;
- Bicycle connections;
- Compressed work week;
- Flextime;
- Dedicated land for transit/bus shelter;
- Onsite amenities (e.g., ATM, day care, cafeteria, convenience retail);

[10] Based on ITE Trip Generation rates.

- Paid parking at prevalent market rates;
- Telecommuting; and/or,
- Other measures not listed above, including child care facilities and an in-lieu fee negotiated with the City.

All projects are subject to an annual survey to determine how well the required TDM measures reduce the actual number of trips generated. In addition, the ordinance outlines an on-going obligation for implementation, monitoring, and reporting which is tied to the land in the event of a change in building ownership.

Appendix UU South San Francisco, California – Municipal Code - TDM

Transportation Management Plan Program – Alexandria, Virginia

Alexandria's Transportation Management Plan (TMP) program focuses on reducing traffic congestion and improving air quality. Alexandria's TMP program, including the ordinance and special use permit requirement, is a strong and comprehensive tool which mitigates the negative transportation impacts of new developments and assures suitable land use and transportation planning.

The TMP program requires developments of a certain minimum size to mitigate traffic and its related impacts with an on-site TDM program. Dating back to 1987, this program has a well-defined range of uses that trigger a TMP. Per the ordinance's requirements, the following land uses must prepare TMPs:

Land Uses Required to Prepare TMPs

Land Use	Minimum Size Triggering TMP
Office	50,000 or more square feet of usable space.
Retail	40,000 or more square feet of usable retail sales space.
Industrial	150,000 or more square feet of usable space.
Residential	250 or more dwelling units.
Mixed-Use	Any combination of space including one or more of the foregoing uses, at the threshold size applicable to that use. If the threshold is satisfied in any of the uses, the TMP must be prepared for all uses present in the project.

It is required that the TMP be created prior to the issuance of building permits. In addition, tenants and/or owners of each site are required to contribute to, and manage, a TMP fund. Revenue from a TMP fund is intended to finance transportation strategies that include incentivizing transit use by offering subsidies and providing additional funding for shuttle bus service or car sharing. Bus shelter construction and maintenance, bicycle lockers, and parking facilities for carpoolers/vanpoolers can also be advanced from a TMP's fund's revenue. The fund stays in an account belonging to the TMP holder but the City can claim this revenue if no approved transportation activities are implemented.

Other key components of Alexandria's TMP program include:

- Intended to promote the use of public transportation, there are two types of percentage goals within its TMP program. The first goal is to attain a 10-30 percent usage for a travel mode other than driving alone for a site's projected peak morning and evening trips. The second goal outlines that no more than 40 percent of projected SOV trips to a development take place between 6am-10am and between 3pm-7pm.

- Developments are required to designate a transportation coordinator. The coordinator is responsible for implementing, managing, and tracking TDM strategies approved in the TMP program. Annual reporting and surveying are required for monitoring.

- A TMP approved by the City is written into the deed and is conveyed in perpetuity with the land. If there is non-compliance with a TMP, the ordinance specifies that zoning tickets will be incurred based on a daily financial penalty.

Appendix VV *Alexandria, Virginia – Zoning Ordinance – Transportation Management Special Use Permits*

TDM Program – Option to Reduce Trip Generation – Bend, Oregon

The City of Bend has a TDM option that allows a developer to reduce their trip generation for traffic study purposes by creating a TDM Program. Chapter 4.7 of the Bend Development Code states "The applicant may choose to develop a TDM program to reduce net new trip generation for a proposed project when trip reductions are necessary to minimize off-site mitigation requirements. Proposed elements of the TDM program will be evaluated to determine trip reduction rates."

Per Development Code Chapter 4.7, the following trip reduction rates shall be applied if a TDM program with these elements is proposed by a developer:

Trip Reduction Rates Based on TDM Program

TDM Program	Trip Reduction
Project provides employee showers, lockers, and secure bcycle parking according to requirements of the Bend Development Code	5%
Project is located within ¼ mile of a transit route	5%
Project is located within ¼ mile of a transit route and employer provides free or significantly reduced monthly bus passes to employees	10%
Project provides free priority parking for carpools/vanpools	5%
Project provides free priority parking for carpools/vanpools but fee non-priority parking for other employees	10%
Other TDM elements as approved by the City Engineer; or, maximum trip reduction for combined TDM program elements	25%

A Transportation Impact Study is also required to show that the proposed trip reductions will be adequate to reduce the development's trips and bring the transportation system into compliance with the operations criteria.

Appendix WW - Bend Oregon – Development Code – Reduce Impacts with a TDM Program

Tiered TDM Plan – Bloomington, Minnesota

In Bloomington, developers are required to complete a TDM plan and join a TMA for any development with more than 1,000 square feet in floor area or 350 parking spaces.

The City's TDM plan has two tiers of programs based on the type and size of a development as well as parking. Tier 1 plans have more rigorous requirements than Tier 2 plans. A TDM plan prepared by a Tier 1 developer must be approved by the City before the building permit is issued and construction can commence. A developer is required to commit to measures selected from a TDM checklist for Tier 2 TDM plans. The checklist is then submitted with the development package.

For Tier 1 projects, Bloomington's ordinance requires a financial guarantee which is determined by the number of parking spaces in the proposed development at $50 per parking space before an occupancy permit is issued. The City established the rate of $50 per parking space to ensure the financial guarantee operates both as an incentive to developers and not a deterrent to development. A TMA plan for a Tier 1 project also requires TMA membership. It is important to note that there is no fee to join the TMA.

Once a development has been completed, annual reports are required. Annual reports need to outline specific measures of success that include trip reduction goals, TDM measures to be implemented, evaluation measures, and a three-year budget for TDM implementation. If the measures outlined in the annual report are met, than the financial guarantee is returned to the developer. Conversely, if it is determined that an employer's efforts to implement TDM measures are insufficient, the fees collected from the financial guarantee can be transferred to the TMA to implement programs on their behalf.[11]

Bloomington handles property ownership changes by adding as a condition of the land deed that the TDM plan be approved and maintained. This ensures that any future property owner must abide by the TDM ordinance. The TDM plan requirements, financial guarantees, and administration process are outlined in the City's TDM ordinance.

Appendix XX Bloomington Minnesota – Transportation Demand Management

Transportation Management Programs – Seattle, Washington

The City of Seattle requires large buildings and developments to reduce the potential for vehicular traffic and parking impacts through Transportation Management Programs (TMP). A TMP identifies how drive-alone commutes of tenants and employees will be reduced. Seattle's TMP program requires a customized TMP for each major building and/or development. A typical TMP outlines the individual building and/or development's TDM goals and the programmatic elements that will be monitored over time. It is important to mention that the TMP is distinct from the State Commute Trip Reduction Law in that it applies to individual buildings, rather than to individual employers.

Seattle regulates TMPs under the authority of Director's Rule DR 10-2012 - Transportation Management Programs[12]. This rule was established to comply with goals, laws, and rules targeted toward reducing congestion and emissions. Under DR 10-2012, the City may require a TMP for a major building and/or development prior to the issuance of building permits, based on a "Director's Decision".

[11] Before a building permit can be issued, the City of Pasadena, California requires a $2,000 deposit upon the submittal of a TDM plan for review and approval. Every property owner is required to pay a $430 fee each time an annual report is submitted.

[12] Director's Rules are binding rules concerning land use, construction, housing, and other codes administered by Seattle's Department of Planning and Development.

In addition to establishing property owner responsibilities, DR 10-2012 also identifies the ordinance authority and establishes the content, procedures, compliance, and reporting requirements of TMPs. DR 10-2012 includes a matrix with a list of TMP elements that are either required of all developments, highly recommended, or are location-dependent. The TMP elements are subdivided by major focus areas that include building and frontage features, management and promotion, parking management, transit, carpool and vanpool programs, bicycle/walking programs, and additional incentives for owner-occupied buildings.

A comprehensive approval and compliance evaluation process requiring surveying and reporting is part of the program. A binding agreement is also required with the project applicant that allows the City to pursue enforcement actions if the building and/or development does not meet its requirements.

Appendix YY Seattle, Washington – Transportation Management Programs – Director's Rule 10-2012

Transportation Sales Tax & Required TDM Traffic Study Component – Boulder, Colorado

The City of Boulder is nationally regarded for its forward thinking approach to TDM and commitment to SOV alternatives and has one of the lowest SOV rates for all trips by residents of any city without a rapid transit system. A major contributor to this low SOV rate is the City's utilization of parking revenues to subsidize the cost of public transit in its CBD. As a result, the City is able to provide a free annual all-access bus pass (known as the Eco Pass) to all 7,000 downtown employees.

In 1967, Boulder established a dedicated transportation sales tax to fund transportation programs (0.1% or one cent on a $10 purchase). In 2007, voters approved an extension of the transportation sales tax through 2024. This transportation sales tax helps fund Boulder's bus system, Community Transit Network, as well as bicycle, transit, and mobility programs that advance alternative modes of transportation as well as reduce traffic.

The success of Boulder's programs is due to several factors that include collaborating with the regional transit authority and working closely with the Transportation Management Organization (TMO)[13], Boulder Transportation Connections. This collaboration includes, but is not limited to, evaluating and implementing TDM plans, as well as allocating funding for programs.

Boulder's Design and Construction Standards require a TDM component for every Traffic Study. A Traffic Study is required for any development proposal where trip generation from the development during the peak hour is expected to exceed 100 vehicles for nonresidential projects, or 20 vehicles for residential projects.

[13] A TMO is an entity similar to a TMA.

A TDM toolkit has been established which allows developers to select one of three TDM packages designed to meet the needs of the area they are building in. All three packages must offer basic TDM measures that include but are not limited to: assigning an Employee Transportation Coordinator, providing ridesharing information, bicycle parking, and program evaluation. Details of each package are described below:

Package A
Any developer who is within the area served by Community Transit Network must provide a 100 percent transit subsidy (Eco Pass) for all employees/tenants for a three year period and financially guarantee the funds in a city-controlled escrow account.

Package B
When providing a transit subsidy is not a viable or practical option due to a low level of transit service, a developer needs to establish a program which requires limiting and charging for parking. Examples include managed and paid parking, parking cash-out, and/or unbundled parking.

Package C
Developers can opt to create their own TDM plan. Developers are required to work with City staff to design a customized plan which is required to include a process to evaluate the TDM plan's effectiveness as well as be approved by the City.

Boulder has also begun looking into creating TDM taxing districts. A TDM taxing district will collect a tax to run TDM programs for a defined area. TDM programs which include Eco Passes, discounted bicycle share memberships, and free car share memberships will be provided to all employees and residents within a TDM taxing district. In the near future, a TDM taxing district will be piloted in the Boulder Junction area.

Appendix ZZ Boulder, Colorado – Charter -Transportation Sales Tax

'Trip Credits' for Implementing TDM Measures – Menlo Park, California

The City of Menlo Park's Municipal Code allows new developments to take "trip credits" for implementing TDM measures. The intent of the 'trip credits' is to encourage the use of creative ways to mitigate the traffic impacts of new development projects. The City reviews these guidelines with the developer and determines what combination of TDM measures will reduce the net number of trips the project is anticipated to generate on the City's roadway network to a non-significant level.

A program of TDM measures with corresponding 'trip credits' helps to simplify the process of developing a TDM program and establishing the level of trip reduction the developer is seeking. The table below shows some examples of TDM measures and the number of trips credited for each.

Trip Credits Based on TDM Measure

TDM Measure	Number of Trips Credited
Bicycle lockers and racks.	One peak hour trip for every 3 new bicycle lockers/racks installed and maintained.
Operation of dedicated shuttle service during the peak to rail station or urban residential area.	One peak hour trip for each peak hour round trip seat on the shuttle. Increases to 2 trips if a guaranteed ride home program is in place.
Charging employees for parking.	One peak hour trip for each parking spot charged at $35/month for one year.
Implementation of a vanpool program.	Seven peak hour trips for each vanpool arranged. Increases to 10 if a guaranteed ride home program is also in place.
Implementation of a compressed work week program.	One peak hour trip for every 5 employees that are offered the opportunity to work 4 compressed days per week.
Combination of any two elements.	Five peak hour trips.

Appendix AAA Menlo Park, California – Municipal Code - "Trip Credits" for TDM Measures

Trip Reduction Plan with Required TDM Measures – Santa Monica, California

In an effort to reduce traffic congestion and improve air quality, Santa Monica adopted a Transportation Management Ordinance in 1990. Containing a fee structure, survey requirements, and a detailed Trip Reduction Plan of required TDM measures, Santa Monica's Transportation Management Ordinance is complex, comprehensive, and incorporates various strategies.

Of particular note is Santa Monica's substantial fee structure. For example, any employer in Santa Monica with over 10 employees is required to pay an annual fee per employee. Small businesses with less than 50 employees are charged $16.83 per employee and employers with over 50 employees are charged $13.25 per employee. These fees have resulted in a substantial annual operating budget of over $400,000 for the City.

Employers are required to complete an annual survey to determine the Average Vehicle Ridership (AVR) for their worksite. The survey, which is supplied by the City, requires a 75 percent response rate. All employers are expected to achieve an AVR of 1.5 or better. If an AVR of 1.5 is attained in the first year, a 33 percent credit in the annual employment fee is given; a 50 percent credit is given in year two; and a 60 percent credit for year three or more. Moreover, if an employer is a TMA member, a 25 percent discount is given.

Trip Reduction Plans are comprised of three categories: marketing programs, support strategies (e.g., guaranteed ride home program), and subsidy based strategies (e.g., parking cash-out). When developing their TDM programs, employers are required to select a minimum of five elements within each category.

Santa Monica's Transportation Management Ordinance requires extensive annual reporting from employers. Of the 758 employees who are subject to annual reporting (the paperwork is 46 pages in length), about 20 percent use consultant services. If an employer is found to be in violation of the Transportation Management Ordinance, they will be fined $5.00 per employee per day.

In 2013, Santa Monica adopted an ordinance which established a Transportation Impact Fee for new development and intensified land uses. Revenue from the Transportation Impact Fee will fund transportation improvements such as new sidewalks, crosswalks, traffic signal upgrades, transit, and bicycle facilities that are necessitated by the new trips associated with land use change. The fees, which are charged prior to issuance of building permits, are based on residential units or commercial square footage.

Appendix BBB Santa Monica, California

Ordinance Requiring Non-Residential Development Projects to Adopt Emission Reduction Plans and Pay Transportation Impact Fees

Ordinance Establishing the Transportation Impact Fee Program

Specific TDM Measures

Car Sharing – Seattle, Washington

Car sharing provides individuals with access to a fleet of shared vehicles, discouraging individual car-ownership. Businesses can use car-sharing use to replace their fleet vehicles. Car sharing at the workplace allows employees to take transit, walk or bicycle to work, since a car will be available for business meetings or errands during the day.

The City of Seattle's Municipal Code allows for up to 5 percent of the total number of a project's parking spaces be used to provide parking for vehicles operated by a City recognized car sharing program. The number of required spaces may be reduced by one space for every parking space leased by a City recognized car sharing program. In addition, for any development requiring 20 or more parking spaces that provides spaces for vehicles operated by a car sharing program may reduce their parking by the lesser of 3 required parking spaces for each car sharing space or 15 percent of the total number of required parking spaces.

Appendix CCC Seattle, Washington - Municipal Code – Parking for Car Sharing Programs

Priority Parking for Carpools and Vanpools – Portland, Oregon

Employers that have their own parking facilities can encourage carpooling and/or vanpooling by reserving preferable parking locations (e.g.; close to building entrances or covered). These locations should offer an advantage over other parking but should not be closer than handicap parking spaces.

Portland, Oregon requires office, industrial, and institutional uses with minimum parking requirements over 20 spaces to reserve 5 percent of the spaces or 5 spaces, whichever is less, for carpools. The spaces must be the closest to the building entrance or elevator other than handicap spaces.

Appendix DDD Portland, Oregon - Zoning Code - Priority Parking for Carpools and Vanpools

Unbundled Parking – San Francisco, California

The cost of parking for residential and commercial units is frequently passed on to the occupants indirectly through the rent or purchase price rather than directly through a separate charge. For example, a three bedroom unit might come with two parking spaces included in the rent or purchase price. Consequently, renters or owners are not able to purchase only as much parking as they need and are not given the opportunity to save money by using fewer parking spaces. An alternative is to unbundle parking - lease or sell parking spaces separately, rather than automatically including them with building space. By changing parking from a required purchase to an optional amenity, vehicle ownership and parking demand can be reduced. Unbundling parking is an effective strategy that

encourages households to own fewer cars and rely more on walking, bicycling, and transit. In addition, unbundling parking allows developers to use space which would have been allocated for parking for other components of a building's design. Unbundling parking has shown to reduce parking demand by 10-30 percent.[14]

San Francisco requires unbundling in both downtown commercial and residential zones (DTR and C-3 Districts) for all residential structures over ten dwelling units. The City's ordinance also requires that inclusionary affordable units have the same opportunity to purchase or lease parking spaces as other units. SOMA Studios and Apartments is an example of the results of San Francisco's policy of encouraging the unbundling of parking costs from housing costs. Unbundling parking has resulted in a total of 66 parking spaces for the development's 74 apartments and 88 studios. With the available space, a childcare center and retail development were able to be included in the development's design.

Appendix EEE San Francisco, California - Planning Code - Unbundling of Parking Spaces

Reduced Parking Near Frequent Transit Service – Portland, Oregon

Portland, Oregon strikes a balance in its approach to reducing parking minimums and setting maximums in relation to the proximity of transit service. Their zoning ordinance sets much lower maximums where frequent transit service is provided or in areas that are zoned for more intense development. In areas where development is less intense, higher maximums are appropriate, such as beyond a 1/4 mile walk to a bus stop or a 1/2 mile walk to a rail transit station. Minimum parking requirement standards apply for sites located less than 1,500 feet from a transit station or 500 feet from a 20-minute peak hour service. This zoning approach is set upon the concept that limiting the number of parking spaces will promote efficient use of land, enhance urban form, and support transit ridership.

Appendix FFF Portland, Oregon - Zoning Code - Parking Minimums and Maximums

Electric Vehicle Requirements – Lancaster, California

The use of electric vehicles can improve air quality and decrease energy consumption, both of which are critical components of TDM. The City of Lancaster, California's municipal code requires design and performance standards for electric vehicle charging stations (EVCS) as part of new commercial development in specific zones. Specifically, developers are required to provide the necessary electrical service capacity and equipment to serve 2% of the total parking spaces with EVCS. Of these parking spaces, half shall initially be provided with the necessary electric vehicle supply equipment to function as on-line EVCSs upon project completion. The remainder shall be installed at such time as they are needed for use by customers, employees, or other users. The table below outlines types of development requiring provisions for EVCS.

[14] Todd Litman, Victoria Transport Institute.

Types of Development Requiring EVCS Provisions

Hospitals Construction of a hospital of 500 or more beds, or expansion of a hospital of that size by 20% or more.
Colleges Construction of a post-secondary school (college), public or private, for 3,000 or more students, or expansion of an existing facility having a capacity of 3,000 or more students by an addition of at least 20%.
Hotels or Motels Hotels or motels with 500 or more rooms.
Industrial, Manufacturing, or Processing Plants/Industrial Parks Industrial, manufacturing, or processing plants or industrial parks that employ more than 1,000 persons, occupy more than 40 acres of land, or contain more than 650,000 square feet of gross floor area.
Office Buildings or Office Parks Office buildings or office parks that employ more than 1,000 persons or contain more than 250,000 square feet of gross floor area.
Shopping Centers or Trade Centers Shopping centers or trade centers that employ 1,000 or more persons or contain 500,000 square feet of gross floor area.
Sports, Entertainment, or Recreation Facilities Sports, entertainment, or recreation facilities that accommodate at least 4,000 persons per performance or that contain 1,500 or more fixed seats.
Transit Projects Transit projects (including but not limited to transit stations and park and ride lots).

Lancaster's Municipal Code also requires new residential developments to provide for EVCS connections. Specifically, garages serving each new single-family residence and each unit of a duplex shall be constructed in a manner to allow for the future installation of electric vehicle supply equipment to provide an EVCS for use by the resident. Similar EVCS provisions apply for 20% of the total parking spaces in new multiple-family projects of 10 dwelling units or less and for 10% of the total parking spaces for new multiple-family projects of more than 10 dwelling units.

Appendix GGG Lancaster, California - Municipal Code - Design Requirements and Performance Standards for Electric Vehicles

State Programs

Commute Trip Reduction (CTR) - Washington

In 1991, the Washington State Legislature passed the Commute Trip Reduction (CTR) Law to address traffic congestion, air pollution, and petroleum fuel consumption. In 2006, the CTR Efficiency Act was passed. This act requires local governments in urban areas with traffic congestion to develop programs to adopt CTR plans and ordinances for major employers[15]. Designed to leverage state investment, the CTR program has proven to be an effective tool that eases congestion and encourages employees to find alternatives to drive-alone commuting.

CTR targets workplaces with 100 or more full-time employees in the most congested areas of the state. Employers develop and manage their own programs based on locally adopted goals for reducing vehicle trips and miles traveled. Employers regularly report on their programs and jurisdictions report on progress toward meeting SOV and VMT reduction targets, as well as their use of state CTR funds. More than 1,050 worksites and 530,000 commuters statewide participate in the CTR program.

It has been estimated that for every taxpayer dollar that goes into the program, businesses invest approximately $18. Additionally, employers who provide financial incentives for employees to commute by non-SOV modes and offer a CTR program can be eligible for a tax credit against their business and occupation (B&O) or public utility tax (PUT) liability. This credit is equal to 50 percent of the incentive payments paid by the employer, up to $60 per employee per year. In order to ensure the success of the CTR program, collaboration is necessary between state and local governments, transit agencies, and employers.

Appendix HHH State of Washington's Commute Trip Reduction Program
Spokane County, Washington – Code of Ordinances – Commute Trip Reduction

Concurrency - Washington

Concurrency is a growth management policy intended to ensure that necessary public facilities and services are available concurrent with the impacts of development. In Washington State, most local jurisdictions plan under the Growth Management Act (GMA), adopted by the State Legislature in 1990. The GMA is a state policy framework for local comprehensive planning and land use regulation. Concurrency is one of the GMA's fourteen goals.

The GMA defines a specific transportation concurrency requirement. First, local jurisdictions must set LOS standards, or minimum benchmarks of performance, for transportation facilities and services[16]. The adopted LOS serves as the local jurisdiction's standard to

[15] The CTR Law is now incorporated into the Washington Clean Air Act as RCW 70.94.521-551.

[16] RCW 36.70A.070(6)(a)

measure the impacts new development would have on the local transportation system. A local jurisdiction is then required to measure whether the service needs of a new development exceed existing capacity. If it is determined that adequate capacity is not available, the developer is then required to either implement the necessary improvements at the time of development or make a financial commitment to complete the improvements within six years[17]. It is important to note that transportation is the only area of concurrency that specifies denial of development if LOS standards cannot be met.

Local jurisdictions must have a program to correct existing deficiencies and bring existing transportation facilities and services up to locally adopted standards. If the impacts of a proposed development would result in LOS dropping below the standard, the local jurisdiction must either change the standard or deny the application unless the appropriate transportation improvements are made concurrent with development. A local jurisdiction can also accommodate development impacts by changing the phasing or timing of the new development.

Concurrency is not a guarantee of system performance, rather, it is achieved when adequate public facilities are in place and functioning at the adopted LOS at the time development occurs. Additionally, a developer cannot not be required to pay for improvements to correct existing deficiencies.

It is worth mentioning that implementing a transportation concurrency requirement in Massachusetts would most likely face significant legal challenges.

Appendix III State of Washington's Growth Management Act
State of Washington's Growth Management Act - Concurrency

Parking Cash-Out Program - California

A parking cash-out program refers to employees who are offered subsidized parking are also offered the cash equivalent if they use alternative travel modes instead of driving a personal vehicle to work. California state law requires certain employers[18] who provide subsidized parking for their employees to offer cash allowance in lieu of a parking space. Enacted in 1992 and referred to as the parking cash-out program, the intent of the law is to reduce vehicle commute trips and emissions by offering employees the option of 'cashing out' their subsidized parking space and taking transit, biking, walking or carpooling to work.

Costs associated with the program may be deducted as a business expense for employers. Employees who opt for the cash-out must pay income tax on it, but employers can eliminate the cash payment and provide a mix of transit passes, ride-share subsidies and cash to reduce the tax liability.

Appendix JJJ State of California's Parking Cash-Out Program

[17] RCW 36.70A.070(6)(b)
[18] Employers with over 50 employees in an air basin designated nonattainment area for any state air quality standard.

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